THE IRON TRADE REVIEW

Volume LVII Cleveland, July 22, 1915 *No. 4*

Italy is Enquiring for Steel Rails

And Russia is Expected to Place Large Tonnages—Orders for Finished Materials Heavy—Prices Advancing

THE volume of new business coming to finishing mills steadily grows, the demand from both foreign and domestic buyers being very active. The latest inquiry for rails for export is from Italian state railways, which have entered the market for 20,000 tons. The New York Central lines are in the market for 1,500 all-steel automobile cars. The Southern railroad has ordered 4,500 tons of rails from the Tennessee company.

Railroad Buying

Russia is expected to order at least 100,000 tons of rails in addition to the 200,000 tons recently ordered. Car orders of the past week amount to over 4,000, including 2,000 hoppers placed by the Baltimore & Ohio, and 2,000 box cars by the Chicago, Burlington & Quincy.

Pig Iron

Buying of steel-making pig iron has continued during the past week and it is probable that even heavier tonnages will soon be placed. Orders for basic pig iron placed by Cleveland offices for manufacturers in Cleveland and the Mahoning valley are estimated at about 100,000 tons. The Cleveland Furnace Co. will blow in its second stack, which has been idle for a year. The Republic Iron & Steel Co. has purchased 20,000 tons of bessemer at $14, valley. The southern pig iron market has developed considerable strength and $10 for No. 2 foundry, Birmingham, is now the quotation made by all except one maker. There is decidedly better sentiment in Chicago and throughout the central west.

Plates and Shapes

Premiums of $4 and $10 a ton have been paid for prompt shipment of plates from an eastern Pennsylvania mill and the plate situation continues to grow stronger, with lower quotations rapidly disappearing. Similar condition prevails in regard to structural shapes. On shapes, plates and bars, quotations are being gradually advanced to 1.30c, Pittsburgh, for delivery at any time during the remainder of this year. The Bethlehem Steel Co. has been awarded 38,000 tons of rails and supplies for New York subway extensions, and the American Bridge Co. will probably be awarded 20,000 tons for elevated work in Brooklyn.

Ferro Manganese

Uncertainty has been added to the ferro-manganese situation on account of British makers notifying agents in this country that they will not be able to guarantee shipment to this country after Aug. 1. The prolonged delay in the opening of the Dardanelles, causing doubt as to the shipment of manganese ore from Russia, is an important factor of the situation.

Machinery

The demand for lathes and other machine tools for export is again very active. During the past week, many orders were entered for shipment to belligerents. Some of the inquiries are very urgent as to delivery, but call for such large numbers of tools that it will be impossible to make delivery as promptly as desired. One inquiry is for 700 lathes and another for 200 lathes.

Bars and Billets

The General Electric Co. is inquiring for 29,000 tons of rounds for the manufacture of high explosives, deliveries to extend until September, 1916. Early action is expected on an inquiry for 70,000 tons which has been pending for some time. Deliveries of steel bars are becoming more extended and consumers are anxious to contract as far as possible. Purchases of billets by the Steel Corporation now amount to about 85,000 tons. There is a scarcity of both billets and sheet bars and prices are advancing.

Scrap

The scrap market continues to show signs of improvement and prices are being marked up in several important centers. Coke prices are strong, but the volume of business now pending is not very large.

THE OPEN HEARTH

Importance of Uniform Action

THE ACTION of railroads in Pennsylvania and Ohio in announcing that a charge of 20 cents per ton will be made for handling slag delivered within the states is a virtual acknowledgement of the contention of the steel interests in the hearing before the interstate commerce commission at Washington that the case was properly one for state commissions, rather than for the interstate commission, as about 90 per cent of the slag hauling is intrastate. The railroads then clearly showed their preference for control by the interstate commission and, while they have not abandoned hope in that direction, they are trying to collect 20 cents per ton on all intrastate business, at least in Pennsylvania and Ohio.

As was pointed out in these columns last week, the evidence presented at Washington demonstrated that a great deal of the slag hauled by railroads is of value to them. The brief of the Carnegie Steel Co. and other companies contained a table, giving an estimate of the expenses of the railroads in handling slag, ashes and refuse material for a period of one year and also an estimate of the benefits accruing to the railroads. Expenses were estimated at $3,029,-051 and the benefits at $3,364,696, leaving a profit to the railroads of $335,645. Doubtless this table and all of the testimony taken at Washington which is applicable to hearings in the state will be available when the state boards take up consideration of this important matter. The West Virginia board has already suspended the proposed tariff and similar action will doubtless be taken in Pennsylvania and Ohio. Uniformity of action is highly important in the three states, for it certainly would not be fair to compel industries of one state to pay for hauling slag and refuse matter and not require similar payment in an adjoining state. Hence we would respectfully suggest to the commissions of the three states that insofar as the law will permit joint action be taken.

Some furnace companies at lower lake cities are now selling their slag for road-building and other purposes, and one of the results of the present agitation doubtless will be to bring about a greater use of slag for commercial purposes. This would be strictly in harmony with the modern idea of conserving materials rather than wasting them. At this time, when there is so much commendable agitation in favor of better roads, increased use of slag would promote the movement and, at the same time, bring a fair revenue to the furnace companies as well as a fair freight rate to the railroads. Some of the leading independent companies are showing no interest in the present controversy because they have found profitable methods of disposing of their slag.

War Orders and Domestic Trade

THE far-reaching effects of the present European war in stimulating the activity of the iron and steel industry of this country are being shown in innumerable instances each day. This influence is so extensive and diversified that the true proportion that it bears to the present expanding rate of production is most uncertain. In fact, it is a mooted question among steelmakers themselves and few, if any, of them will agree in their views.

The direct war orders, that is, those involving such steel as is needed on the battle line, can readily be ascertained by each maker from his own experience and this varies in accordance with the willingness or the success of the particular companies in accepting such business. Decided divergence of opinion is to be noted, especially in regard to the indirect business resulting from the war and in the amount of bona fide domestic trade that is arising. In reality, the solution of this question becomes one as to how far back the originating cause of the particular order should be traced. A good part of the active shipbuilding work now in progress along the Atlantic coast clearly is an example of the indirect influence of the war upon industry. The fact that many merchant ships belonging to the belligerent nations have been forced off the seas, and the fact that foreign yards are filled with war work have been moving factors in the upbuilding of this trade.

Consider a case where a shop orders plates to build tanks for a manufacturer of dies, who is forced into making his own supplies of this kind by the shutting off of his foreign shipments by the war. This also is a "war order" in a remote sense. That is, the war was the original impelling cause for this business. The amount of such domestic business in no way related to the conduct of the war undoubtedly is very large. But is not this a branch of domestic trade, which must be differentiated from what have come to be regarded as the normal needs and use of steel by home buyers?

Apparently it is necessary to know how much of this indirect trade has been caused by the war before the question as to the extent that the purely domestic steel business now is expanding can be answered with accuracy.

By the death of Dr. Joseph Austin Holmes, director of the bureau of mines, the cause of safety sustains a severe loss. While the bureau of mines under Dr. Holmes' direction made marked progress in other lines, the work for which he was especially noted in recent years was the prevention of accidents among underground workers. He never saved himself, and it is doubtless true that he was a victim of overwork

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in the cause which was so dear to his heart. He was a public servant of great ability and of the highest personal character.

Problems of Government Control

THE EFFORTS now being made by England to control industries engaged in the manufacture of munitions of war are illustrating in a very impressive way the difficulties connected with government regulation or control. The munitions of war bill in times of peace would be called a highly socialistic measure, but the government feels impelled by necessity to adopt extreme measures and we do not desire to challenge the correctness of its position. It would be well, however, for other countries to watch the progress of government control in England, for they may thereby be warned of the danger of socialistic experiments.

One of the objects of the munitions of war bill is to control profits derived from the manufacture of munitions. The bill provides that net profits of shipments controlled by the government are to be arrived at in accordance with the rules drafted by the minister of munitions. The state is to take all the net profits, during the time an industry is controlled, in excess of the average, plus one-fifth, of the preceding two corresponding periods prior to the war.

The Iron and Coal Trades Review, of London, publishes a table showing the net profits of representative firms for the past year and for the previous two years and declares that the proposed system penalizes the firm which has been conservative in estimating profits, while the directors of companies which have been guilty of the doubtful financial practice "window dressing" are given opportunities of making a larger profit than that to which they would really be entitled. Our London contemporary also points out the difficulty of dealing with industries which are controlled by trade unions. While the masses of the working people of Great Britain have, as a rule, done their best during the war to keep the wheels of industry moving and have succeeded where the open shop prevails, agitators for trade unions have not hesitated to make trouble and to raise various questions as to wages and as to whether a man should do more in a day than he did before the war. The problem of the government in controlling any kind of an industry is very serious, but this is true to a very much greater extent in the industries controlled by trade unions than in those in which the open shop prevails. On the whole, the problems presented by the control of industries are almost staggering. But the government has this advantage, namely, that it can appeal to the patriotism of the workers. To attempt similar control in times of peace would be more difficult than in times of war. Hence we believe now is the time for nations at peace to stop and look squarely in the face conditions prevailing in their countries and resist any efforts of socialistic agitators to bring about government control.

Post Bellum Competition

AFTER THE WAR, competition with Germany is to be more severe than before and it is imperative for American manufacturers to cut their costs to the bone, and do it in a hurry. Such is the view expressed in a recent address by Robert Grimshaw, consulting engineer and lecturer in New York University, who, although an American citizen, lived many years in Germany. He has come from that country within a year and is thoroughly familiar with conditions in Germany and the United States.

Mr. Grimshaw says that after the war there will be in Germany alone at least two million men who will return home and find that they have no jobs. Some of them will see that factories where they worked before the war have been closed and some of them will discover that their jobs have been filled by women and children. Mr. Grimshaw believes that these men will be put to work at about 50 cents a day and that the product of their hands is going to be dumped upon this and other countries. He also says that there is a large class of work being done now in Germany, but the product cannot be shipped on account of war conditions. He believes that as soon as peace is declared and ships are free to travel without being molested, this product of the war period will also be dumped in the United States and other countries now at peace.

These are statements worthy of the most careful consideration by everyone who has at heart the welfare of the working people of this country. In discussing the question as to what is to be done about it, Mr. Grimshaw says that the tariff is usually made by people who do not know anything about it, or else by those who know too much about it and consult their own interests instead of those of the general public. There is a great deal of truth in this statement and it is high time to begin a scientific investigation to determine as nearly as possible what kind of a tariff bill should be enacted. This should be done by a non-partisan commission, and done thoroughly. Then when the war ends, we shall have at hand a mass of facts of great value to guide congress in quickly passing a tariff bill, if a revised tariff is not placed upon the statute books before peace is declared.

Prices Present and Past

Quotations on leading products July 21, average for June, 1915, average for April, 1915, and average for July, 1914. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices July 21, 1915.	Average for June, 1915.	Average for April, 1915.	Average for July, 1914.
Bessemer pig iron, Pittsburgh..	$14.95	$14.58	$14.55	$14.90
Basic pig iron, Pittsburgh.....	13.95	13.54	13.45	13.90
No. 2 Fdy. pig iron, Pittsburgh	13.70	13.45	13.45	13.90
Northern No. 2 Fdy., Chgo....	13.00	13.00	13.00	14.00
Lake Superior Charcoal, Chgo..	15.75	15.25	15.75	15.75
Malleable, Bessemer, Chgo.....	13.00	13.00	13.00	14.00
Southern No. 2, Birmingham...	9.50	9.50	9.50	10.00
Southern Ohio No. 2, Ironton.	12.50	12.50	12.75	13.00
Basic, eastern Pa.....	13.75	13.75	13.25	14.00
No. 2X Virginia furnace.....	12.50	12.50	12.50	12.50
No. 2X foundry, Philadelphia..	14.50	14.25	14.25	14.75
Ferro mang.. Balt., (prompt)..	98.00	105.00	78.00	37.50
Bessemer billets, Pbgh.....	22.00	19.87	19.50	19.30
Bess. sheet bars, Pbgh.....	22.50	20.37	19.60	20.20
Steel bars, Chicago.....	1.44	1.39	1.39	1.28
Steel bars, Pittsburgh.....	1.25	1.20	1.20	1.11
Iron bars, Philadelphia.....	1.22	1.17	1.17	1.17
Iron bars, Cleveland, local del'y.	1.20	1.20	1.15	1.20
Iron bars, Chgo. mill.....	1.20	1.15	1.15	1.05

	Prices July 21, 1915.	Average for June, 1915.	Average for April, 1915.	Average for July, 1914.
Beams, Chicago	$ 1.44	$ 1.39	$ 1.36	$ 1.28
Beams, Pittsburgh	1.25	1.20	1.15	1.11
Beams, Philadelphia	1.359	1.359	1.309	1.25
Tank plates, Pittsburgh.....	1.20	1.15	1.11	1.11
Tank plates, Chicago.....	1.44	1.31	1.28	1.28
Tank plates, Philadelphia.....	1.359	1.359	1.309	1.25
Sheets, blk., No. 28, Pittsburgh	1.75	1.80	1.80	1.80
Sheets, blue an., No. 10, Pbgh.	1.35	1.35	1.30	1.35
Sheets, galv., No. 28, Pbgh....	4.50	4.46	3.30	2.75
Wire nails, Pittsburgh.....	1.60	1.55	1.59	1.51
Connellsville fur. coke contr...	1.75	1.65	1.65	1.85
Connellsville fdy. coke, contr...	2.25	2.25	2.25	2.29
Heavy melting steel, Pbgh....	11.75	11.75	11.90	11.55
Heavy melting steel, east'n Pa.	12.00	11.25	11.25	10.50
Heavy melting steel, Chgo.....	10.25	9.37	9.30	9.50
No. 1 wrought eastern Pa.....	13.00	12.50	12.50	12.00
No. 1 wrought, Chgo.....	9.00	8.75	8.55	9.00
Rerolling rails, Chgo.....	10.25	10.00	9.85	11.25
Car wheels, Chgo.....	10.50	9.87	9.80	11.00

(For Additional Prices See Page 198)

More Sales of Steel Making Iron

Continued Buying of Basic and Bessemer in the East and Central West—Malleable Advance Expected at Chicago

Pittsburgh, July 20.—Heavy selling of steel-making pig iron grades last week firmly established the market at prices about 25 cents a ton higher than those previously prevailing. The Republic Iron & Steel Co., which bought 10,000 tons of basic about three weeks ago, has purchased 20,000 tons of bessemer from a steel works interest at Youngstown, on the basis of $14, furnace; it is understood the Republic company will furnish the seller with a large ore tonnage. Italian buyers have purchased 5,000 tons of bessemer from a valley interest at $14, furnace, and that figure appears to represent the bottom of the market for either domestic or foreign shipment. The Colonial Steel Co. still is negotiating for about 10,000 tons of basic for consumption the last five months of the year; this grade is being held at $13, valley. The Westinghouse Electric & Mfg. Co. is inquiring for second half requirements for its foundries on the North Side, Pittsburgh, and at Cleveland, and the company will cover first half needs for the Cleveland plant if attractive prices are offered. Approximately 10,000 tons of Nos. 1, 2 and 3 grades will be purchased for shipment before Jan. 1. Numerous inquiries for foundry and malleable grades are pending and most dealers have withdrawn quotations below $13, valley. The Carnegie Steel Co. is operating 46 of its 58 blast furnaces and the Jones & Laughlin Steel Co. is blowing nine of its 10 stacks.

Steel-Making Sales Predominate

Philadelphia, July 20.—While sales have been lacking in tonnage, the more promising tone in general of the iron market in this district has been maintained. The largest business of the week has been done in basic, of which there has been unexpected buying by a steel company usually independent of the market, which has been forced to draw metal from other producers because of an accident to one of its furnaces. The company has closed for 4,000 to 5,000 tons of prompt iron from two producers at around $13.70, delivered, and is figuring on additional tonnage. Makers now are talking more strongly for $14, delivered, on basic; in fact, some of them are naming this figure, as, with the increased operation of steel works, the amount of this grade offered by companies which supply their own needs and also sell considerable merchant tonnage, is less. Low phosphorus continues to stiffen under a good demand. Standard iron now is held at $19, maker's furnace, or about $21.60, Philadelphia, and the Lebanon grade is unchanged at $16.50 to $17, furnace. Canadian melters continue to buy considerable standard quality. Sales of the week totaled about 1,500 tons of standard and 1,500 to 2,000 tons of Lebanon iron. Foundry iron still is backward in improvement, but $14.50, Philadelphia, for No. 8X, is the present minimum. One or two Lehigh valley makers have advanced to $14.50, furnace, for No. 2X, which is considerably above the domestic market. Virginia iron remains at $12.50 to $13, furnace, for No. 2X. Sellers report an aggregate of about 2,000 tons in recent transactions, some of them at the higher figure. A number of furnace changes are to be noted. The Colonial furnace at Riddlesburg has gone out for relining and also the No. 1 Swedeland, the latter because of a blowout. Warwick A will go in at an early date and Emaus some time in August. Foreign iron inquiries are quite numerous here, including 5,000 tons of bessemer or hematite for Italy, and a large tonnage for England.

Heavier Than Reported

Cleveland, July 20.—Recent sales of pig iron in the Cleveland district by Cleveland furnaces and by Cleve-

(*For complete prices see page* 198)

land agencies for furnaces outside the Cleveland district have been heavier than first reports indicated. Positive proof of the recent activity is furnished by the decision of the Cleveland Furnace Co. to blow in its second stack within a few days. One stack will then be on foundry grades and one on basic. The two stacks of this company have not been in blast simultaneously at any time within a year.

On foundry grades of pig iron, the quotation is now on a basis of $13, furnace, for delivery outside of Cleveland, and $13.50 delivered in Cleveland. This is an advance of 50 cents per ton. Some sales have been made at the new figure. On the whole, the pig iron outlook in the Cleveland district shows decided improvement.

Prices Stronger.

Cincinnati, July 20.—All southern furnaces but one have advanced to $10, Birmingham basis, for southern No. 2 foundry iron for the last half, and it is expected that before the end of the week all No. 2 foundry to be had at $9.50, Birmingham, will have disappeared. Southern Ohio No. 2 foundry is also showing a tendency to advance and dealers have been notified to expect $13, Ironton basis, as the minimum quotation for the last half, in the near future. Present southern Ohio prices range from $12.50 to $12.75, Ironton basis. The feeling in the market is much more optimistic because of the large consumption of pig iron, and producers are looking for a good demand before the first of the year.

Shipments of iron on old contracts continue good. Present sales show but slight improvement. A local melter has taken 3,000 tons of southern and 1,500 tons of northern foundry grades, and the J. A. Fay & Egan Co., this city, has purchased 500 tons of foundry iron.

Almost Lifeless

St. Louis, July 20.—Pig iron continues dull and almost lifeless, with nothing more than a small tonnage sold here and there last week, and only a few such inquiries on the market today. Southern No. 2 ranges in price around $9.50 to $10, Birmingham basis. Northern iron is quoted at $13 to $13.50, Chicago, and $13, Ironton.

Expect Malleable Advance

Chicago, July 20.—Distinctly better sentiment prevails in the Chicago pig iron market and this extends to the point where it is expected confidently an advance to $13.50, Chicago furnace, will be made on malleable iron within the next week. Expectation of this advance is thought to be one factor bringing about unusual activity for this grade of iron. Foundry and malleable have been at an even price for a long time, but furnacemen believe the latter should command a higher price, as it is subject to less competition and under ordinary demand should be maintained at a higher level without difficulty.

Inquiry continues to be brisk and for the most part is in earnest and results in sales. Considerable tonnages of both foundry and malleable have been booked within the past fortnight and the demand keeps up. Sales during June were not quite up to the mark set for May, but deliveries were considerably in excess of shipments during May. Comparatively few melters are holding back on their shipments, and for the most part iron is moving freely to all sorts of industries.

Increase in active furnace capacity is expected to be brought about within a short time and at least one stack is being placed in condition now to be blown in at any time when conditions warrant such action.

Both No. 2 foundry and malleable are being contracted at present at the former level of $13, Chicago furnace, but one important interest has withdrawn all quotations and probably will not quote further except on an advanced basis for malleable.

The Illinois Malleable Iron Co. closed recently for about 3,000 tons of malleable, taken from a number of sellers. The Berlin Machine Works, of Beloit, Wis., just closed for 500 tons and the American Brake Shoe & Foundry Co. has taken about 5,000 tons of northern and southern.

One large southern producer has notified its sales agents that it is well sold up for last half, but expects to blow in another stack shortly and will have a limited tonnage to dispose over the remainder of the year, and will contract nothing under $10.50, Birmingham. Former low prices on southern foundry iron, which have been as low as $9.50, Birmingham, have disappeared, and $9.75 at present appears to be the bottom of the market, with all signs pointing toward $10 being the minimum shortly.

Contracting for coke in this territory has been occupying attention of sellers for the past month and practically all large users are now taken care of with only a few yet to close for their requirements over the next six months, or full year. Most of this coke, which is by-product, was sold at $5 to $5.10, delivered Chicago, which is equivalent to about $2.50, Connellsville. This is about the same level as prevailed when contracts were made last year.

(For complete prices see page 198)

Heavy Southern Sales

Birmingham, Ala., July 20.—Sales aggregating over 50,000 tons at prices on a basis of $10 for No. 2 foundry, Birmingham, have been closed during the week and the market appears much stronger. One interest has quoted $10.25 on a bid for 5,000 tons to a northern buyer and it is reported the deal may be closed at that figure for late delivery this year.

Speculators are in the market with inquiries for 40,000 and 50,000-ton lots, but no deals have been closed, as far as can be learned. Two 10,000-ton sales to northern buyers were closed during the week by one concern for No. 2 at $10. An order for 10,000 tons of No. 3 is reported also at $10, which is on the basis of $10.50 for No. 2.

The Sloss-Sheffield Steel & Iron Co. contemplates resumption of operations at one of its local furnaces Aug. 1, making four furnaces in blast for this company, and the fifth to be blown in in the Birmingham district in a period of a month, with more contemplated.

Advance Needs Appear

Buffalo, July 20.—Furnaces of the Buffalo district report that a number of foundry interests of the territory served have come into the market for contract needs extending over the rest of the present year and into 1916. The producers, however, are loth to book iron orders into 1916 except at prices much higher than prevail in the market at this time. The general tone of the market and the degree of activity, based upon the volume of iron going out under contract, indicate that higher prices will soon prevail.

Furnaces report that nothing less than off-grade iron is obtainable at less than $12.50 and the producers are again establishing the grade differentials which were absent so long from the range of prices. From the minimum on gray forge iron at $12.50 to the maximum on No. 1 foundry and Scotch iron at $13.50, the market is holding to a spread of one dollar.

The Union Trust Co., of Pittsburgh, acquired properties of the Pittsburgh-Buffalo Co. for $1,500,000 at a public auction at Pittsburgh last week. The sale was subject to a lien of a first mortgage made in 1909. The holdings of the Pittsburgh-Buffalo Co., purchased by the Union Trust Co., include several large mines situated in western Pennsylvania.

Bar Buyers Are Hustling

To Place Orders as They See Order Books Filling Rapidly and Prices Advancing

Philadelphia, July 20. — Advancing prices and lengthening deliveries by the mills manifestly forced various important buyers of steel bars in this district, who have been deliberating or seeking lower figures, to take sudden action in closing contracts the past week. Sales of this character call for at least 15,000 to 20,000 tons. The Baltimore & Ohio and Pennsylvania railroads placed with different makers 3,000 tons and about 2,000 tons, respectively, for last half, and the price is understood to have been 1.25c, Pittsburgh. A jobber doing considerable export business closed for 5,000 to 6,000 tons for last half, and the Traylar Engineering Co., Allentown, Pa., placed 2,800 tons of 3½-inch rounds for shells with an eastern Pennsylvania mill. Other third quarter and last half buying was done. Specifications have continued very active and deliveries with the mills on certain sizes now have fallen back to six to eight weeks. At least three of the largest makers of steel bars now quote 1.30c, Pittsburgh, or 1.459c, Philadelphia. Other mills have not yet dropped the 1.25c, Pittsburgh figure, though they will shortly, as they now are asking 1.30c, Pittsburgh, for fourth quarter. Export prices on steel bars also have been advanced $1 to 1.25c, mill, for third and 1.30c, mill, for fourth quarter.

More War Material Wanted

Pittsburgh, July 20.—Definite inquiries for 29,000 tons of steel rounds for the manufacture of shrapnel and high explosive shells have been sent out by the General Electric Co., Schenectady, N. Y. The inquiry calls for 25,600 tons of 3-2/10-inch rounds and 3,300 tons of 2⅞-inch rounds for delivery before September, 1916, although the bulk of the tonnage is wanted before Oct. 1, of this year. British specifications are furnished, but finished material will be shipped to Russia. Steel bars are being quoted at 1.30c by more important makers and that figure already has been established. While the bulk of the larger sizes of rounds is going into war material, yet the domestic trade is active.

Reinforcing Bars

Cleveland, July 20.—The Franklin Steel Co., Franklin, Pa., has booked orders for 600 tons of rerolled reinforcing bars for a new building for the Goodrich Rubber Co., Akron, O., and 350 tons for a new building for the Firestone Rubber Co., of the same city. It is now delivering on the contract for 250 tons for the new Westinghouse foundry in Cleveland. The steel bar market is very strong and buyers are anxious to contract, the usual contract price being 1.25c, Pittsburgh, for third quarter and 1.30c for fourth quarter, although several of the largest makers will not sell for less than 1.30c for any delivery this year.

Deliveries Extended

Buffalo, July 20.—Mills and agencies of the Buffalo district report that deliveries are becoming more and more extended on bars and other materials. Prices are being firmly held at the advance to 1.30c, base, recently established and there is talk of a further advance within the next month. Some interests are quoting 1.35c for last quarter. Reports indicate a revival of activity on the part of manufacturing interests indirectly associated with the steel industry, showing that plants that were operated for sometime on half-time or less are now beginning to work up to capacity operation with order books well filled.

Steel Bars Higher.

Chicago, July 20.—A general advance of $1 per ton on steel bars, to 1.49c, Chicago mill, has had the effect of strengthening the situation materially. Specifications on previous orders at lower quotations are being received in large volume and some small tonnages are being sold at the higher quotations to those who were not protected by previous contracts. The tonnage at 1.49c, Chicago mill, is not large and any considerable sales at this figure probably will not come until somewhat later. A few mills in the east, represented here, are asking 1.54c, Chicago, but simply because they cannot take on any further tonnage.

Hoops, Bands and Shafting

Pittsburgh, July 20.—Cold rolled steel shafting now is being held by some makers at 65 per cent off list, or $1 a ton above the generally quoted price. It is not improbable the 66 per cent off figure will be withdrawn at an early date. Makers of shafting are operating plants at about maximum capacity and enough tonnage already has been booked to assure activity the remainder of the year. Bands are held at 1.30c, the prevailing price of steel bars. Hoops are quoted at 1.30c by most makers, but some material is being sold at $1 a ton below that figure.

Bar Iron Slow.

Chicago, July 20.—Bar iron continues to lag and mill operations are not increased materially. Indications from wagon and agricultural implement builders are that better tonnage will come out shortly and sellers are awaiting an increase in demand. The price remains steady at 1.20c, Chicago.

(*For complete prices see page* 198)

Early Action

Is Expected on Inquiry for 75,000 Tons of Rounds

New York, July 20.—An inquiry for 75,000 tons of 3½-inch rounds for shrapnel shells for shipment to French works which has been before sellers in this district for several weeks still is pending but early action now is awaited. Tonnage lots of shell bars continue to arise from week to week and are being placed with the mills, but the buyers are much more willing to accept mill propositions as they find them and are not insisting so strongly on the full letter of specifications as to cut lengths, annealing, etc., as they were originally. Likewise they are paying higher prices and rounds of 2 inches and over seem firm at present at 2.00c to 2.25c, mill. The reason for this is the heavily-filled condition of the mills. Some large makers continue to make no promises on rounds 2 inches and over, under five to six months. A shell maker in this territory has just placed another good tonnage with western mills. Outside of shell business, the steel bar trade is brisk and specifications are active. Deliveries run from three weeks upward. Most makers now quote 1.30c, Pittsburgh, but 1.25c has not disappeared.

Pipe Order

Involves 16,000 Tons—Price of Boiler Tubes Advanced

Pittsburgh, July 20.—Orders for 200 miles of 8-inch steel pipe, involving 16,000 tons, have been placed with a prominent mill in this district. Under date of July 16, the National Tube Co. advanced quotations for steel boiler tubes $2 a ton. The last previous advance for steel boiler tubes was June 15. Prevailing prices for steel boiler tubes are $6 a ton above those quoted before May 1. Quotations for wrought iron boiler tubes have also been boosted here $2 a ton.

Sheet Mills

Are Increasing Operations—Still Some Price Irregularities

Pittsburgh, July 20.—Sheet mills in western Pennsylvania and eastern Ohio have increased operations slightly the last 10 days. Specifications against contracts by automobile builders and electrical equipment manufacturers are heavy and car builders are increasing orders to a slight extent. Galvanized sheets now are obtainable at a range from 4.50c to 5c for No. 28 gage. Some sellers still are out of the market because of the spelter situation. No. 28 gage black sheets have stiffened moderately, but the 1.75c quotation has not entirely disappeared. Blue annealed sheets reflect moderate improvement and quotations below 1.40c for 10 gage are being withdrawn.

Active Buying Continues in East

Philadelphia, July 20.—Buyers of sheets who have been among the slowest to respond to the recent change in the market, now are losing no time in closing with certain Pennsylvania makers. In fact, they are offering to take on more tonnage for forward delivery than the makers care to accept at this time. So heavy has been the recent buying that leading makers in this territory are said to have the largest order books in their history, and they are operating at full capacity. The effect on prices is that 1.40c, Pittsburgh, or 1.559c, Philadelphia, for No. 10 blue annealed now is minimum and 1.45c and even 1.50c is being obtained in some cases. Pacific coast buying still is backward.

Steel Irregular

Cleveland, July 20.—Some mills well supplied with orders are quoting No. 10 blue annealed at 1.40c, Pittsburgh, and No. 28 black at 1.80c, Pittsburgh. There is, however, still considerable irregularity in quotations and sales of blue annealed are being made at 1.35c, Youngstown.

New Deal in Sheets.

Chicago, July 20. — Although the leading producers of galvanized sheets in the west continue to remain out of the market, a new plan is being followed in the case of buyers who must have a supply. The leading independent is willing to make a price on sufficiently large tonnage on an ironclad agreement not subject to decline in sheets or spelter and based on the price which must be paid for spelter at the time the contract is taken. On this basis it is possible to obtain a tonnage which is absolutely needed. As far as miscellaneous lots are concerned, to be sold under the usual market custom, the situation remains as before.

Black sheets are in comparatively small demand and unchanged.

Sheets Steady.

Cincinnati, July 20.—The continued refusal of mills to quote very far ahead has handicapped sales of both black and galvanized sheets, but spot shipment business is good. Rolling mills are carrying good stocks, but warehouses appear to have a light supply. Mills in this territory are running from 75 to 90 per cent of capacities. Black sheets No. 28 gage are quoted at from 1.75c to 1.80c, Pittsburgh basis, and galvanized sheets No. 28 gage at from 3.75c to 4c, Pittsburgh basis.

Tin Plate Mills Busy

Pittsburgh, July 20.—Numerous inquiries for tin plate for shipment abroad continue to come out and manufacturers are enjoying fairly attractive prices on export business. The domestic market shows no snap and material is obtainable at as low as 3.10c.

Coke Market

Not Very Active, But Prices Are Firm—Production Decreased

Pittsburgh, July 20.—Negotiations for 10,000 tons of blast furnace coke a month for extended delivery, have been opened by a prominent consumer of Connellsville fuel. It is understood a sliding scale contract is being considered. Forty-eight-hour coke is being held at $1.75, ovens, for shipment this quarter. The position of the market for the fourth quarter has not been established. While some sellers of foundry fuel have boosted quotations above $2.50, ovens, yet it is known rather heavy tonnages of desirable fuel have been obtained the last 10 days at $2.25, ovens. The market for spot furnace and foundry coke shows no snap. The *Connellsville Courier* says production ending the week of July 10 was 340,742 tons, a decrease of 30,669 tons compared with the week before. The Fourth of July holiday caused the reduction in output.

Higher Prices Expected

Philadelphia, July 20. — All present indications in the eastern market point to a more buoyant condition of furnace coke and the expectation of higher prices is expressed even among the buyers. It is believed that $2 coke is not far distant. As recently noted, one eastern Pennsylvania steel company paid $1.85, Connellsville, for its requirements for the next three months. Instances are noted where the ovens which sold to middlemen at $1.75 a few days ago now are quoting $1.90, ovens. Some quotations of $2.25, Connellsville, for all next year delivery have been made to eastern consumers. The Northern Iron Co. is inquiring for 6,500 tons monthly for the rest of the year or for a longer period.

(*For complete prices see page* 198)

Cleveland Furnace Buys

Cleveland, July 20.—A Cleveland furnace has purchased a limited tonnage of coke for early delivery to supplement its supply of by-product coke. For prompt delivery, the lowest quotation on furnace coke is $1.75, while $1.80 is quoted for delivery within 15 days and $2 for later delivery. Foundry coke is strong and one important seller has withdrawn temporarily from the market, as it has all the orders it cares to take at present.

Coke Stronger.

Cincinnati, July 20.—Coke prices are strong and show a tendency to advance, but today are unchanged from the level that has held for several months. No important sales have been made during the past week, and the only inquiry pending is for about 20,000 tons of furnace grades for a Virginia stack. Shipments of both furnace and foundry grades are heavy, especially on the latter.

Higher at St. Louis

St. Louis, July 20.—In view of the labor disturbances in the Connellsville district, where many foreigners are returning to the old country on account of the war, 72-hour Connellsville foundry coke has risen in price to $2.60 to $2.75 a ton on contract. The market in St. Louis however, is very dull, and there does not appear to be any good reason to expect an early improvement.

Wire Mills Active

Pittsburgh, July 20.—The domestic wire market is seasonably quiet, but most mills in the Greater Pittsburgh district are operating at maximum theoretical capacity on contracts placed earlier in the year. Heavy tonnages of plain and barb wire and nails are being shipped to all quarters of the globe, and belligerent European nations continue to buy large quantities of barb wire. Nails are being held at $1.60 a keg, but it is not improbable some consumers may be able to shade that figure when the season of autumn buying begins.

Premiums Paid on Plates

Eastern Pennsylvania Mill Obtains Bonus for Quick Delivery—Many Vessel Propositions Still Pending

Philadelphia, July 20.—Reappearance the past week of the payment of premiums to eastern Pennsylvania mills for prompt shipment plates, demonstrate eloquently the rapid trend of the recent market and the present filled-up condition of the works. In one instance, $4 a ton extra and in another $10 a ton extra were paid to an eastern Pennsylvania mill for small lots for shipment within a week. Some of the eastern mills are operating so full and are entering such a liberal tonnage of orders that they cannot promise shipments under four weeks. Others can do better, but the situation is becoming more congested weekly. Buyers are beginning to complain of the backwardness of deliveries. The heavy flow of business to eastern plate makers continues to come from many miscellaneous sources, with shipbuilding as the most prominent. Further boats under negotiation make a long list, but awards are slower because of the delayed deliveries. The Ocean Steamship Co., which was figuring on two or three boats, has deferred placing a contract because of the filled condition of the yards. The Newport News Shipbuilding & Dry Dock Co. will extensively rebuild the Standard Oil tanker STANDARD. As an instance of the heavy tonnage which eastern shipbuilding is producing, it is learned the Carnegie Steel Co. now has booked 85,000 tons of plates and shapes covering the work in hand of the New York Shipbuilding Co. Bids went in today on 200 tons of circular plates for Panama. Some eastern Pennsylvania mills have advanced third quarter plates to 1.30c, Pittsburgh, and ask 1.35c, Pittsburgh, for fourth quarter. Others still quote 1.25c for third quarter, but this now appears minimum.

Gaining Strength

Pittsburgh, July 20.—Intense heat of the last few days has materially reduced the output of finishing mills in the Greater Pittsburgh district. Shipments of plates are deferred from one to four weeks. Prices are beginning to show strength for the first time in many months. The Carnegie Steel Co., Jones & Laughlin Steel Co., Republic Iron & Steel Co., and other important makers are asking 1.30c, but the 1.20c figure has not entirely disappeared. The Baltimore & Ohio railroad has awarded contracts for 2,000 steel hopper cars; the American Car & Foundry Co. will build 1,000 and the Cambria Steel Co. and the Pressed Steel Car Co. each will furnish 500 cars. Axles and wheels have not yet been purchased.

Plates Are Stronger.

Chicago, July 20.—Steel plates have advanced as rapidly in price as bars and shapes and most interests are quoting them at 1.49c, Chicago, although the only important independent is willing to take further tonnage at $1 per ton lower. Activity in plates in the east apparently has been greater than in this locality and has had the effect of stiffening this product to an equality with other finished steel. In spite of prevailing quotation being shaded by at least one interest, tonnage is being booked by other sellers at the higher figure. Indications are that mill books will be in condition shortly to put the price of plates entirely on an equality with that of bars.

Billet Prices Advancing

Corporation Purchases Now Amount to 70,000 Tons —Fixed Schedules Are Not Adhered to

Pittsburgh, July 20.—Sharp price advances continue to feature the market for semi-finished steel products. Heavy buying by subsidiaries of the Steel Corporation has caused a rather acute scarcity, and the market is controlled entirely by sellers. Bessemer billets are being held at about $22 and open hearth billets are commanding as high as $23, mill Bessemer sheet bars are named at $22 and open hearth sheet bars at $23, mill. The shortage of sheet bars will be even more pronounced when sheet mills resume operations more fully in galvanizing departments. Wire rods are held at $26 for domestic delivery, but most makers are out of the market. Muck bar is quoted at $27, Pittsburgh.

Sellers' Market in Semi-Finished

Philadelphia, July 20.—A genuine sellers' market in billets and other semi-finished steel, principally open hearth, has developed with the makers in the territory, who have some material of this quality to offer, in the face of a heavy demand. These makers, having entered large tonnages, including the heavy Steel Corporation purchases—which now have been increased by 15,000 to 20,000 tons additional to a total of 70,000 tons from eastern works alone, not including 15,000 to 20,000 tons taken from middle western makers—are not active in making further sales. In fact, the free tonnage of one of these companies is much reduced. Another maker with some tonnage for the market has had offers on 50,000 to 60,000 tons of new business. No fixed price schedules are being followed and each sale depends upon the particular needs of the buyer. Open hearth rolling billets have been sold in the week at $25 to $26, Philadelphia, or approximately $2 to $23, Pittsburgh. Ordinary forging steel is quoted at $29 to $30, Philadelphia, or about $27 to $28, Pittsburgh. Bessemer steel also is tightening. An eastern tin plate maker bought 1,500 tons of bessemer sheet bars at $21, Youngstown, and is asking an equal tonnage for last quarter. A new export sale of 2,000 tons of billets was made this week by an eastern Pennsylvania works. An export inquiry calls for 500 tons to replace a shipment lost on the steamer LEO, sunk by a German submarine last week.

Forging Billets Sold at $28

Cleveland, July 20.—The demand for billets and sheet bars is active and mills are selling their product in a conservative way. A sale of forging billets has been made by a Cleveland company at $28, Pittsburgh. Two sales of open hearth billets have been made to Cleveland consumers at $22, Youngstown.

Exporters' Encyclopedia. — These days when attention is directed to an unusual extent to the possibilities connected with the export trade, the Exporters' Encyclopedia, of which the eleventh edition has just been issued, is of unusual interest. The encyclopedia is a volume of 1,152 pages. It is not a cheap book, for the subscription price is $7.50, but it is worth what it costs to those engaged in the export trade and those who hope to enter that business. It gives an immense amount of information concerning foreign countries and how to conduct trade with them. Monthly correction notes are furnished free to all subscribers with the encyclopedia.

(*For complete prices see page* 198)

Doubt Envelops Ferro

Uncertainty as to Shipments From England—Delay in Opening of Dardanelles is Factor

New York, July 20.—Fresh uncertainty has arisen in the ferro-manganese situation, through the receipt of cables from English producers during the past several days in which it is stated that it is doubtful at present whether they will be able to assure the continuance of shipments to this country after August 1. These makers have refused to sell any further lots for forward shipment under the conditions of the moment and have declined offers in considerable quantities at $100, seaboard, put up to them by their agents. It is stated it is impossible to make any promises regarding further deliveries against contracts with consumers in this country after the date given.

No explanation is offered officially for this new attitude of the English makers, but the general belief in the trade is that it results from the fact that shipments of manganese ore from India have not been as large as anticipated and that the opening of the Dardanelles thereby releasing Russian ore is much more uncertain than originally expected. For that reason, it is deemed wise to conserve the supply of ferro-manganese in England. One report in the market is that the British authorities have learned that despite the restrictions, ferro shipped to this country has been re-exported to Germany and that they are considering stern measures against the American trade. This explanation of the present development, however, does not gain much credence in view of the known reduced receipts of ore in England.

Shipments of ferro-manganese now en route to this country under July licenses probably total 8,000 to 10,000 tons. They include about 3,000 tons on the MALVERN RANGE, about 3,000 tons on the RAPIDAN and some tonnage in the NICOSIAN and other boats.

A wider range of prices for both spot and forward ferro-manganese has developed along with the more extensive offering of the domestic-made product. The official price of $100, seaboard, which direct sellers of the English metal continue to quote has been shaded by other sellers in a number of instances, the range being usually within $95 to $100 seaboard. In one or two cases where the tonnage was considerable and the period of deliveries more extended, lower than $95, seaboard, is reported to have been done. A sale of a small lot of domestic product for spot shipment to an eastern consumer within a week was done at between $98 and $99, seaboard. Certain of the domestic producers have sold freely in recent months and, in one case, the total of such transactions runs from 5,000 to 10,000 tons. The English product also has been subject to some concessions where dealers have had the metal in hand on this side and desired to market it at the present time. At the same time, further sales of English ferro for shipment over the rest of the year continue to be made at $100, seaboard. Transactions aggregating at least 1,000 tons were upon this basis in the week.

Alloys Reflect Strength

Pittsburgh, July 20.—Sellers of ferro-manganese say inquiry for prompt and future delivery is rather heavy and several lots have been sold for prompt shipment. This material is being held at $100, seaboard, and above. Fifty per cent silicon is listed at $73, Pittsburgh, for small lots. Manufacturers of tool steel report some difficulty in obtaining tungsten, which is being held at $2.50 a pound of contained alloy. Ferro-carbon titanium is named at a spread from 8c to 12½c, and ferro-vanadium is being quoted at $2.30 a pound by some sellers, although the $2.25 figure represents the price at which the bulk of this material has been sold recently.

Lake Ores

More Freely Purchased—Low Prices Being Withdrawn

Cleveland, July 20.—Iron ore sales continue at a satisfactory rate and it is evident that the volume of business this year will be considerably larger than was indicated earlier in the season. Eastern buyers are showing more interest in lake ores and it is now expected that they will buy them more freely than was originally intended. Quotations below regular prices are being withdrawn and all will disappear before Aug. 1.

It seems apparently certain that over 40,000,000 tons of Lake Superior iron ore will be moved this season. While it has been known for several weeks that the larger steel companies have been moving steadily growing tonnages of ore, considerably larger than was figured at the opening of the navigation season, yet it was not until Vice President D. G. Kerr, of the United States Steel Corporation, made a statement at Duluth yesterday that a firm foundation for the former mere suspicion was found. Mr. Kerr declared that the Steel Corporation will ship more than 20,000,000 tons of lake ore this season. Since the Corporation's lake ore tonnage approximates about half the Lake Superior aggregate, it would seem clear that 40,000,000 tons or more will be brought down as the season's total. Last year the Steel Corporation shipped about 17,000,000 tons.

(*For complete prices see page* 198)

Buy Low Grade Ores.

Philadelphia, July 20.—Eastern Pennsylvania furnaces have purchased some trial lots of the off-grade Lake Superior ores which have been offered recently at attractive prices. These purchases have consisted chiefly of an old-range non-bessemer of 48 per cent iron and 13 per cent silicon content which have been taken at about 7.1 cents per unit of iron delivered to the furnaces or on the basis of about $1.80 at lower lake ports.

Cast Iron Pipe

Is Holding Up Well, But Not Many Orders Are in Sight

New York, July 20.—New business in cast iron pipe in this territory is holding up at about the recent volume but makers are not able to see much tonnage ahead and they now are giving some consideration to this condition. It is thought that New York City now has completed its purchase for the present year. Buying by water and gas companies, however, is active and it may be that the present lack of prospects in public work will not prove an important factor. Prices hold their own at better levels. R. D. Wood & Co. is low bidder on 1,370 tons of 4 to 10's for Totowa, N. J., at $22.75, delivered, as against bids of $23.50 by the Warren Foundry & Machine Co., and $23.60 by the United States Cast Iron Pipe & Foundry Co. The United States Cast Iron Pipe & Foundry Co. took 615 tons of 10's for Ilion, N. Y., at $23.45, delivered. Maywood, N. J., is asking 380 tons of 12 to 20's for bids July 26 which is a contractor's letting. St. Johns, N. B., has taken bids on 200 tons of 6 to 24's and Albany on 800 tons of 6 to 12's. James McAvoy is the low contractor on 400 tons of 4 to 16's for Staten Island. Several good tonnages for export to Cuba and Porto Rico remain unacted upon.

Cast Pipe Sales Slow

Chicago, July 20.—The season for contracting for cast iron pipe has

passed and comparatively few projects are now before pipe makers. This does not indicate lack of activity, for foundries are busy and deliveries are being hurried to meet demands of municipalities now at the height of their construction season. Specifications are being received in large volume and routine tonnage from contractors has kept up excellently. Foundries are running good with their books well filled.

Bids will be opened at Kenosha, Wis., July 26, on 1,200 tons of intake pipe in accordance with amended plans for the city water supply from Lake Michigan. Bids will be opened July 19, at Pontiac, Mich., on 60 tons.

Scrap Buying Increases

And Price Advances Are Recorded in Several Important Centers

Philadelphia, July 20.—A more general buying of old material by consumers in this district has resulted in further advances in prices in many grades the past week. The situation now appears the most active and buoyant since the recent steel works improvement set in. Heavy melting steel has been sold at $12.50 delivered, a new high figure, though one eastern Pennsylvania works which bought several thousand tons at this price takes a higher freight than the average. A New Jersey buyer whose specifications are more exacting than the ordinary also paid this price. Certain steel works have been buying turnings at $9, delivered, borings at $8.75, delivered, stove plate at $10 delivered, and car wheels at $12.50, delivered, all higher prices. The iron mills also have been paying more for certain grades, among others being $11, delivered for wrought pipe, and borings at $8.75, delivered. The foundries are making some fair purchases.

Feeling is Optimistic.

Cincinnati, July 20.—The feeling in the iron and steel scrap market continues better, but sales show no improvement. Dealers are predicting an advance before the end of the month, because of the strength being shown by finished materials and pig iron, but the large surplus of old materials available throughout this territory will undoubtedly keep quotations below normal for a long time. Shipments to rolling mills are heaviest at present, as jobbing foundries are buying only sparingly.

Advances at St. Louis.

St. Louis, July 20. — Scrap prices have stiffened considerably, and there is an advance on nearly all grades. Leading consumers of melting steel, however, do not show much interest in the market at present, but brokers have advanced on all grades, believing that the increased business enjoyed by the mills warrant better prices for scrap. The railroad offerings for the week are light, the only lists out being from the L. E. & W., for 400 tons and the Great Northern for 800 tons.

Stronger at Pittsburgh

Pittsburgh, July 20.—Iron and steel scrap dealers are holding material at prices 25 and 50 cents a ton above quotations offered by *The Iron Trade Review*, but prevailing prices still represent the actual market. The embargo against the Pittsburgh Steel Co. has not been lifted. The manufacture of shrapnel and shells has flooded the market with turnings, which are being offered at $7.50 a ton, or 50 cents below the previously prevailing price. Heaviest consumers of melting steel have enough tonnage under contract to meet requirements three weeks or 30 days.

Tone Improved

Buffalo, July 20.—Dealers of the Buffalo district report that the general tone of the market continues to improve with the appearance of more indications pointing to higher prices. Return of activity of industries on domestic business plus the extensive operations going on in connection with direct and indirect war orders, it is estimated, will create such a demand for scrap that the business will approach a period of almost boom prices. Dealers are holding off and are not disposed to quote at the prevailing prices on material wanted for extended deliveries.

Chicago Scrap Stronger.

Chicago, July 20. — Continued strength reflected in somewhat higher quotations continues to characterize the Chicago iron and steel scrap market. Largely increased operation of steel mills is at the back of the increase as large buying apparently must follow shortly. Brokers are letting matters drift and are refusing to part with their accumulations unless their price is obtained. The market has changed suddenly from a buyers' to a sellers' market and further advances are expected. Railroad activity has lessened and at present no lists are before the trade.

(*For complete prices see page* 198)

Spelter Sags

And Dullness Generally Prevails in Non-Ferrous Market

New York, July 20.—Dullness continues to feature the metal markets generally. This especially is the case with copper which, by reason of low offers on resale tonnage, is quoted lower. At least some producers will sell electrolytic at 19.87½c to 20c, delivered 30 days, and second sellers are offering at prices which figure out to about 19.37½c, delivered 30 days. The market on the best grades of casting copper approximately is 19.25c to 19.62½c, delivered 30 days, while ordinary casting copper can be had for about 17.37½c to 17.50c, cash. The best grades of lake copper continue to be held at about 21c to 22c, cash, while ordinary lake, taking into account the offers of second sellers, is quoted at 19.62½c to 20.12½c, cash, and arsenical lake at 19.50c to 20c, cash.

Second sellers continue to offer low prices on lead. These interests offer tonnages at 5.55c to 5.60c, New York, and 5.50c to 5.55c, St. Louis. Producers continue to hold for 5.75c New York, and 5.62½c to 5.67½c, St. Louis. There are some good foreign inquiries in the market.

Spelter has been in very poor demand and the market has sagged off a bit; some of the producers who had been holding for higher prices now appear to be more willing to accept less. Prime western nominally is quoted as follows: Spot and July, 20.50c to 21c; August, 19.75c to 20c; September, 19c to 19.50c, balance of the year 18.75c to 19c. Brass special spelter nominally is quoted 25c for spot and July, 24c for August and September, and about 23.50c for the balance of the year.

The outside market on aluminum again is stronger and second sellers in some cases are asking nearly 34c on No. 1 ingots in carload lots. The outside market approximately is 32.50c to 33.50c. Small lots may be had around 35c.

The antimony market is quiet and unchanged. Spot Chinese may be had at 35c, duty paid, or a shade less. Future shipment from the far east has been offered recently at prices which figure out to between 36c and 37c, duty paid.

The American Zinc & Chemical Co., with works at Langeloth, Pa., has opened an office at 1420 Oliver building, Pittsburgh.

Shape Mills

Are Falling Behind in Deliveries—Many Plans for Construction

New York, July 20.—New structural awards in metropolitan territory the past week have not manifested the improvement in tonnage into which it is believed the situation is trending, as shown by the better inquiry and the heavier volume of work upon which bids have been or are about to be taken. Furthermore the amount of new construction now in the planning stage is more liberal. The mills are not much concerned over the lack of tonnage placed, as they are still receiving liberal specifications against work previously booked and a considerable amount of miscellaneous new orders is being entered. The shipment demands upon them, in fact, are so large that despite full operations, they are steadily falling back in deliveries. Large eastern shape mills now are three weeks rehind and some of the leading Pittsburgh makers report that their present backlogs in shapes takes up most of their capacity for five months. Buyers after having been favored so long with quick shipments from the mills are meeting the new situation with some show of annoyance. An additional 20,000 ton elevated railroad extension in Brooklyn was bid upon today. A number of the mills have adopted the new 1.30c, Pittsburgh, or 1.469c, New York price for third quarter but 1.25c, Pittsburgh, still is being done by some makers and there are numerous outstanding quotations at that figure or lower which yet are to be disposed of.

War Plant Tonnage Unplaced.

Philadelphia, July 20.—About 15,000 tons of steel for munition plant extension remain before fabricators in this district, and action on these is rather slow because of the numerous details involved. Most of these matters are being negotiated quietly. Injunctions which have been sought to tie up the early commencement of the large rapid transit extension in this city, have not yet been granted by the courts and the matter still is pending. If court obstacles are not interposed, the expectation continues to be expressed that the first steel bids on the Frankfort elevated line which will be about five miles in length will be out in a few weeks. Bids now are being asked on the concrete pier blocks for this work. New lettings in this district are not noteworthy, but considerable tonnage continues to go to the mills and with the heavy backlogs recently accumulated, all producers are running close to capacity. Market prospects are considered good. The Reading railroad has put out a 1,000-ton bridge which is the largest single job this road has offered in a year and a half. Some eastern Pennsylvania shape makers now ask 1.30c, Pittsburgh, or 1.459c, Philadelphia, for third quarter on new business, but still are taking orders on outstanding quotations at 1.25c, Pittsburgh. It is thought most of these open quotations will be disposed of by the end of the present month.

Improvement at Buffalo

Buffalo, July 20.—The interests of the Buffalo district report that the general situation is experiencing rapid improvement. The fabricators are being called upon to figure on a large number of small tonnage orders, plus a liberal number of jobs taking considerable material, and in all a very satisfactory tonnage is involved. Fabricating prices are stiffening. All of the interests of the district have now adopted the recently set base price of 1.30c and there is some talk that this price may go to 1.40c by August. Fabricators are beginning to find it difficult to meet delivery requirements of their customers. Warehouse prices have been advanced by the leading interest on structural shapes and plates, $2 a ton to $1.90.

Shapes More Active

Pittsburgh, July 20.—Specifications for structural shapes have been coming out in better volume and some mills no longer are able to promise immediate shipment. Some fabricating interests still are in need of additional tonnages and prices for fabricated material remain weak and irregular in many instances.

Shapes Quoted Higher.

Chicago, July 20.—Structural shapes have been advanced with bars to 1.49c, Chicago mill, and demand continues strong. Building activity in the west is continuing and settlement of labor troubles in Chicago has opened a market which was closed for some time. A number of projects of moderate size were closed during the past week and nothing of unusual tonnage is now pending in this territory.

CONTRACTS AWARDED.

International Tailoring Co., building, Chicago, 1,100 tons.

Minneapolis St. Louis R. R. Co., and C. & N. W. Ry. Co., viaduct at Marshalltown, Ia., 764 tons, to Minneapolis Steel & Machinery Co.

Illinois building, Champaign, Ill., 692 tons, to Decatur Bridge Co.

Iowa Railway Light & Power Co., transmission towers, between Tama and Blairstown, Ia., 542 tons, to Archbold Brady Co.

C. B. & Q. R. R. Co., through and deck plate girder spans, 500 tons, to American Bridge Co.

Metropolitan Building Co., Seattle, Wash., Arena building, Seattle, Wash., 180 tons, to Hofius, Steel & Equipment Co.

Cleveland Cliffs Iron Co., shaft sets for Francis mine, Swanzy, Mich., 177 tons.

City of Butte, Mont., addition to High school, Butte, Mont., 136 tons, to St. Paul Foundry Co.

The Chicago Tribune, color press building, East Ontario street, Chicago, 130 tons, to A. Bolter's Sons.

Minneapolis General Electric Co., steel stack, Minneapolis, 1,212 tons, to Minneapolis Steel & Machinery Co.

Highway bridge, Springfield, Mass., 250 tons, to the American Bridge Co.

Bridge for the Southern railway over the Rivanna river in Virginia, 300 tons, to the Virginia Bridge & Iron Co.

Addition to the Bulletin building, Philadelphia, 1,000 tons, to the Jones & Laughlin Steel Co.

Bridge works for the Boston & Albany railroad, 600 tons, to the Pennsylvania Steel Co.

High school No. 174, Washington, D. C., 700 tons, to Dietrich Bros.

Municipal building, Detroit, 1,100 tons, to the Riter-Conley Mfg. Co.

Transmission towers in Rhode Island for Stone & Webster, 400 tons, to Millikin Bros., Inc.

Bridge work for the Baltimore & Ohio railroad, 330 tons, to the Fort Pitt Bridge Works.

Rehabilitation of Roach shipyard, Chester, Pa., 500 tons, to the American Bridge Co.

Pier No. 7 at Balboa, Panama Canal, 2,100 tons, Pennsylvania Steel Co. low bidder and will receive award.

Masonic Temple, Syracuse, N. Y., 450 tons, to Smith & Caffrey.

Y. M. C. A. hotel, Chicago, 3,120 tons, to American Bridge Co.

Bar mill buildings for Youngstown Sheet & Tube Co., Youngstown, 3,000 tons, awarded McClintic-Marshall Co.

Schoellkopf Analine & Chemical Works, Buffalo, plant addition, 535 tons, general contract to John W. Cowper Co., steel to Ferguson Steel & Iron Co., Buffalo.

Buffalo Brass & Copper Rolling Mill Co., Buffalo, plant additions, 1,400 tons, to Buffalo Structural Steel Co., Buffalo, steel furnished by Lackawanna Steel Co.

Clover Leaf Milling Co., Buffalo, elevator and mill addition, 300 to 400 tons shapes and bars, to Eastern Concrete Steel Co., Buffalo.

Gurney Ball Bearing Co., Jamestown, plant addition, 200 tons, to Lackawanna Bridge Co., Buffalo.

School No. 14, Rochester, 300 tons, to Genesee Bridge Co., Rochester.

General Electric Co., Erie, Pa., crane runway addition, 150 tons, to Riter-Conley Mfg. Co., Pittsburgh.

CONTRACTS PENDING.

Pier shed at Panama Canal, 2,000 tons, bids asked to be taken later in the month.

Building for the department of the interior, Washington, D. C., 6,000 tons, the John H. Parker Co., New York, low bidder on general contract but no award yet made.

Extensions of plant of the Samuel L. Moore & Sons Co., Elizabethport, N. J., 1,200 tons, bids being taken.

Two more units for Remington Arms Co., Bridgeport, Conn., 1,500 tons, bids being taken.

Addition to the State House, Albany, 150 tons, bids being taken.

Addition to the Gouverneur hospital, New York City, 300 to 400 tons, bids being taken.

Substructure for pier at Thirty-fifth street, Brooklyn, 200 tons, bids being taken.

Bridge work for New York, Ontario & Western railroad, 400 tons, bids being taken.

Connection with Lexington avenue subway

(*For complete prices see page* 198)

line for New York Central railroad, New York City, 1,200 tons, bids being taken.

Bridge for the Philadelphia & Reading railroad at Milton, Pa., 1,000 tons, bids being taken.

Office building, Chestnut street near Broad, Philadelphia, for the Franklin National Bank, about 1,500 tons, plans being issued.

Six bridges for the Pennsylvania railroad at different locations 1,750 tons, Fort Pitt Bridge Co. low bidder and probably will receive award.

Buffalo Bolt Co., Tonawanda, plant addition, taking bids, 300 tons.

Archer-Daniels Linseed Co., Minneapolis, to build mill and elevator at Buffalo, 700 tons for mill. Elevator details later, probably steel bins, 250,000 bushels capacity.

Pig Iron Prices

Are Showing a Tendency to Advance in the East

New York, July 20.—Tidewater prices on pig iron appear to have undergone a stiffening of probably 25 to 50 cents a ton during the past week and business has been placed by buyers by that much higher compared with similar quantities taken only a little over a week ago. The firmer condition of the tidewater market may be attributed largely to the disappearance of the low selling from the Buffalo district, which had kept prices going at around $14.25 to $14.35, delivered at New Jersey tidewater points for No. 2X. Instances are to be noted where $14.75, delivered, on high silicon iron was paid within the week as against similar sales at $14.35, delivered, a few days previously. Eastern Pennsylvania makers who individually have been naming advances now seem more confirmed in this attitude and competitive business has been taken this week at $14.25, Lehigh valley furnace, for No. 2X or approximately $15, tidewater. The actual range of the market now seems not below $14.50 to $14.75, tidewater, for northern No. 2X. Trading has been quiet this week but has shown some inclination to expand during the past few days. A Jersey buyer took 1,000 tons of high silicon for last half which is in addition to 2,000 tons of the same grade recently placed. The American Brake Shoe & Foundry Co. closed for 2,500 tons of mixed foundry grades for last half delivery in the Chicago district. A new inquiry for 2,500 tons of No. 2X for last half is out in this territory. Small lots have been more numerous. A fresh grist of export inquiries aggregating a large tonnage, largely steel-making iron for Italy, has appeared, but there are repetitions and an apparent lack of genuineness in some so that it is believed the bona fide lots do not exceed 10,000 tons, chiefly hematite. One good-sized tonnage has been closed pending freight arrangement. France asks 2,000 tons of high manganese bessemer. Argentine is asking for spiegeleisen and ferro-manganese. Freights are easier and range from about 47s 6d to 50s to Italy and 35s to 40s to the British Isles. The Port Henry furnace may resume soon.

Russian Orders

For Steel Rails Are Expected to Call for Large Tonnage

New York, July 20. — Count S. I. Shulenburg, president of the Russian Railway Commission, has arrived in New York to supervise the execution of recent large contracts for rails, track material, rolling stock and other supplies recently placed in this country and to close additional contracts of this character. Count Shulenburg possesses more plenary powers for making purchases of railroad requirements than any representative of the Russian government who yet has come to the United States and much importance is attached to his visit by steel makers and equipment builders. Russia still has large purchases of rails, equipment, etc., to place in this country for the enlargement of its present railroad system. It is expected that at least 100,000 tons more of rails will be placed here, which will be in addition to the over 200,000 tons already closed, including the latest contracts of 100,000 tons to the Cambria Steel Co. and 60,000 tons to the Lackawanna Steel Co., announced in last week's *Iron Trade Review*. It is likely that some of the rails awarded the Cambria Steel Co. may be rolled by the Maryland Steel Co. at Sparrows Point owing to the quick shipment required. The Lackawanna Steel Co. already is rolling its portion of the latest order.

Car orders of the past week total over 4,000. The Baltimore & Ohio placed 1,000 hoppers with the American Car & Foundry Co., 500 hoppers with the Pressed Steel Car Co., 500 hoppers with the Cambria Steel Co. and 50 passenger types with the Pullman Co. The Chicago, Burlington & Quincy ordered 1,000 steel underframe box cars from the American Car & Foundry Co. and 1,000 of the Bettendorf Co. Car inquiries still are not numerous but there is more figuring being done by various railroads, some of it informally. The Western Maryland is credited with considering 1,000 cars.

On the 27,000 to 37,300,100 pound running and on the 1,815 to 2,465 tons of guard rails for New York City subway extensions bid upon last week the Bethlehem Steel Co. and the Lackawanna Steel Co. submitted identical figures and the order probably will be divided. The Bethlehem Steel Co. has taken 1,000 tons for the Norfolk & Western and 2,500 tons for the Chesapeake & Ohio railroads.

(*For complete prices see page* 198)

Strike a Fizzle

Remington Employes Decide Not to Quit Work

New York, July 21. (By wire.)—The much talked about strike of machinists and other munition workers at Bridgeport, scheduled to begin Monday afternoon proves a fizzle. Only a few machinists responded to the strike call. The men of the Remington plants reconsidered their vote to strike when the company guaranteed an eight-hour day beginning Aug. 1 and $1 advance, and all remained at work. Other Bridgeport plants are affected only slightly. Agitators still threaten trouble.

Bessemer Sale at Higher Price

Pittsburgh, July 21. (By Wire.)—A domestic consumer has closed for 600 tons of bessemer iron at $14.25, valley, for fourth quarter delivery. This price is 25 cents a ton above the generally quoted market. Some sellers are asking that figure for immediate shipment. Scattering lots of foundry grades are selling at a spread of $12.75 to $13, valley, for No. 2.

Coke dealers are asking higher prices and it is reported that furnace fuel for shipment the next three months has been sold at $1.85, ovens.

American Bridge Will Get Elevated Work

New York, July 21. (By Wire.)—Post & McCord are low bidder on the Culver avenue elevated extension, Brooklyn, which means 20,000 tons of steel will go to the American Bridge Co.

The Bethlehem Steel Co. has been awarded about 38,000 tons of rails and supplies for the New York subway entensions.

The plant of the old Lehigh Valley Structural Co., Allentown, Pa., has been taken over by a new company, the Allentown Structural Steel Co., headed by Wm. P. Bruckman.

The Bradford Machine Tool Co., Cincinnati, has let contracts for a 2-story office building, which will adjoin its plant on Evans street. The new addition will be 16 x 21 feet.

The plant of the Erie Foundry Co., Erie, Pa., manufacturer of steam hammers, trimming presses, squaring shears, gray iron castings, etc., is operating 24 hours a day.

Money and Iron: Fact and Comment

War Stocks Make Big Gains—Increased Earnings Reported by the Lackawanna Steel Co.

LAST WEEK was one of decided movement upward on the part of leading stocks connected with the iron and steel business, especially those which are credited with having large orders for munitions. The advance started Monday, when Bethlehem moved up 9 points, and American Locomotive and Pressed Steel Car advanced 4 points. Bethlehem made a new high point of 176. Tuesday's transactions on the New York exchange exceeded 650,000 shares. Bethlehem at 178½, American Car at 51⅝, General Motors at 178 and Studebaker at 81¾ attained the highest points ever recorded. Steel common advanced to 62, but finished the day weak. Further advances were made Wednesday and Thursday. On Thursday, Steel common advanced to within ¼ of a point of its 1915 high mark, making an advance for the day of 2¼ points. Friday, sales amounted to 700,000 shares and a number of so-called war stocks advanced to new high points. On the whole, the week was one of decided optimism in Wall street.

Quotations at the close of business July 17 and changes in the leading stocks identified with the iron and steel industry for the week are shown in the following table:

Amer. Brake Shoe & Fdy. Co., ctfs.	106½	+3½
Amer. Brake Shoe & Fdy. Co., ctfs., prfd.	162	+7
American Can	52⅞	+7
American Can, prfd.	105⅛	+5⅛
Amer. Car & Fdy. Co.	58	+5½
Amer. Car & Fdy. Co., prfd.	114	.....
American Locomotive	51½	+7
American Locomotive, prfd.	95⅞	— ⅛
American Steel Foundries	42¼	+7⅛
Baldwin Locomotive	73½	+6½
Baldwin Locomotive, prfd.	102½	+ ⅞
Bethlehem Steel	187⅛	+20⅛
Bethlehem Steel, prfd.	120	+3
Colorado Fuel & Iron	34⅞	+5¼
Continental Can	67½	+3¼
Continental Can, prfd.	99¾	.. ¾
General Electric	167	+5
International Harv. of N. J.	97	— ½
Internat'l Harv. of N. J., prfd.	110	+ ¼
Inter. Harv. Corp.	...	.....
Inter. Harv. Corp., prfd.	...	.....
Nat'l. Enamel'g & Stamp. Co.	19	.....
Nat'l En. & Stmp. Co., prfd.	83¼	—1¼
Pressed Steel Car	50½	+5½
Pressed Steel Car, prfd.	.....	.....
Pullman Palace Car	156¼	.....
Republic Iron & Steel Co.	34⅛	+5⅝
Republic Iron & St'l Co., prf.	90½	+3⅜
U. S. Cast Iron Pipe & Fdy.	16	+2⅝
U. S. Cast I. P. & Fdy., prfd.	41	+4
United States Steel	64⅞	+5⅜
United States Steel, prfd.	111	+1⅝
Westinghouse Mfg.	103½	+6½

Much Better Showing

Illustration of the way steel companies now are adding to their earnings, is shown by the statement of the Lackawanna Steel Co. for the second quarter ended June 30, 1915, which gives the profit for that period as $268,384, as compared with a deficit of $565,758 in the first quarter of 1915 and of $338,472 for the second quarter of 1914. The deficit of the company for the first half of 1915 is $297,374, against a deficit of $783,680 for the first half of 1914. Unfilled orders on June 30, 1915, were 283,979 tons, as against 229,910 tons on March 31, an increase of 54,069 tons. There was no report on unfilled tonnage for the quarter ended Dec. 31, 1914, but preceding that the orders were as follows:

Sept. 30, 1914	166,344 tons
July 1, 1914	128,880 tons
March 31, 1914	191,828 tons
Dec. 31, 1913	185,427 tons
Sept. 30, 1913	255,945 tons
June 30, 1913	466,675 tons
March 31, 1913	623,816 tons

Improved Prospects

Col. George Pope, sole receiver of the Pope Mfg. Co., in Connecticut, has filed his report for June, showing cash on hand July 1 of $93,180.18, as against $70,464.83 on hand on June 1. It shows that creditors can, before long, expect another dividend from the sale of assets in that state, while the company has substantial assets in Massachusetts. The prospects are that the creditors will be paid practically in full on their claims.

Trade Acceptances

The federal reserve board, at Washington, has issued a regulation as to trade acceptances, making them a distinct class of commercial paper, "for which the board is ready to approve the establishment of a discount rate somewhat lower than that applicable to other commercial paper."

The board expresses the belief that the new regulation will considerably enlarge the scope of service of the federal reserve banks and incidentally assist in developing the class of double name paper which has shown itself in so many countries a desirable form of investment and an important factor in modern commercial banking systems.

The trade acceptance should not be confused with the bank acceptance, which is common in England. In the latter, the bank lends its credit, but in the case of the trade acceptance, the bank does not lend its credit. The seller draws on the buyer, who accepts.

While the action of the federal reserve board does not adopt the system in vogue in Europe, the new regulation is a step toward a larger use of acceptances, as advocated by Isaac F. Marcosson in an article published in *The Iron Trade Review* of Jan. 7, 1915.

Reports of Merger

Result in Statement Being Made by Pennsylvania R. R. Co.

Continuing reports regarding a prospective merger of the Cambria Steel Co. and the Pennsylvania Steel Co., which in the past few days have taken the form of a declaration in stock market circles that the Pennsylvania railroad had given H. C. Frick an option on all of its holdings in the Cambria company, have called forth a public statement from that road. This is as follows:

"It can be authoritatively stated that the Pennsylvania Railroad Co. has not given an option on its Cambria Steel Co.'s stock to Mr. Frick, nor is there any basis for the reported consolidation of the Cambria and Pennsylvania Steel companies. When Mr. Donner became chairman of the Pennsylvania Steel Co. he was given an option on a portion of the Pennsylvania company's holdings, both in the Cambria and Pennsylvania Steel companies."

It generally has been understood that Mr. Frick is the largest single individual holder of Cambria Steel Co. stock, and that his ownership in this respect has been exceeded only by the stock held by the Pennsylvania railroad, which represents a controlling interest. The Pennsylvania railroad, out of deference to the wishes of the federal government, has been making plans for some time to divest itself of its stock in the Cambria as well as the Pennsylvania Steel Co. The latter also is a majority holding. The general steel trade for some time has been expecting the ultimate merger of the two companies.

The American Ore & Reclamation Co., New York, recently established an office at 2441 Oliver building, Pittsburgh.

Mining Institute

Meets at Ironwood, Mich., Sept. 6-9—Will Visit Cuyuna Range

The annual meeting of the Lake Superior Mining Institute will be held Sept. 6-9, starting on the Gogebic range with Ironwood, Mich., as headquarters. Visits will be made to the Cuyuna range and to the Minnesota School of Mines at St. Paul.

On the opening day, mines in the vicinity of Ironwood will be visited and the second annual first-aid meet will be held. This contest is being arranged by the institute committee on the prevention of accidents, of which Charles Lawrence, Palatka, Mich., is chairman. Other members of the committee are W. H. Schacht, Painesdale; M. H. Godfrey, Virginia; P. S. Williams, Ramsay, and William Conibear, Ishpeming. Edwin Higgins, engineer for the bureau of mines in the Lake Superior district, will have general supervision of the meet.

The members will leave the Gogebic range on Monday night, Sept. 6, for the Cuyuna range, where one day will be spent visiting mines. This will be the institute's first visit to this range.

On Tuesday night, the members will leave for St. Paul, where two days will be spent in inspecting the Minnesota School of Mines, visiting the Minnesota state fair and participating in various entertainments which will arranged for them.

L. M. Hardenburgh, Hurley, Wis., is president of the institute, and Luther Brewer, Ironwood, is chairman of the general arrangements committee. Business sessions will be held at Ironwood and on the Cuyuna range.

Death of Jas. W. Wilson

James Wilson Weaver, secretary and treasurer of the Thomas Iron Co., Easton, Pa., died at his home in that city on July 8, after nearly a year's illness from Bright's disease. He had been in the employ of the Thomas company for 45 years, having started as an apprentice in the machine shop in 1867 at the age of 15, and filling various positions in the offices of the company until his appointment as secretary and treasurer in December, 1892. With the exception of three years, in which he served as bookkeeper of the Coplay Iron Co., Coplay, his entire business career was spent with the Thomas Iron Co. Mr. Weaver was also secretary and treasurer of the Ironton Railroad Co., the Thomas Railroad Co. and the Saucon Valley Iron & Railroad Co., all subsidiaries of the Thomas company. He was one of the best known citicens of Easton, having been actively connected with the school board for nearly twenty years.

Two Millions

Expended by Ford—Will Begin on New Plant at Early Date

Detroit, Mich., July 19.—In round numbers, $2,000,000 is what Henry Ford spent in acquiring approximately 2,000 acres of land west of Detroit for the erection of a tractor plant, blast furnaces, etc. Announcement to this fact was made during the present week and the state is realizing thousands of dollars on the filing of abstracts.

If possible, ground for the new plants will be broken this summer. Mr. Ford has announced that this forms the basis of his wishes, but there is a good chance that active working operations will not be started before fall.

The locating of this immense plant has given property values in that part of Detroit a tremendous boost. Residents of the district have been realizing big profits in the sale of their properties and real estate agents have been plunging in gathering land contracts.

Wages Raised

Cincinnati, July 20. — Four of the larger manufacturers of machine tools here have voluntarily advanced machinists' wages 10 per cent effective at once. These plants include the Lodge & Shipley Machine Tool Co., the American Tool Works Co., the Cincinnati Milling Machine Co., and the R. K. LeBlond Machine Tool Co. About 5,000 workmen are affected. This advance was purely voluntary on the part of the above plants and was not made through any agreement with the machinists' union. The motive behind the movement is to share the large earnings of the machine tool plants with the workmen during the present busy season when a large number of employes have been asked to work overtime and to speed up their work as much as possible. Similar action is also being considered by several other plants here that have full order books.

Will Soon Resume.—Fire Sunday morning, July 18, damaged the plant of the Interstate Iron & Steel Co., at Cambridge, O. The loss is fully covered by insurance. Work has been started immediately to repair the damage and the mill is expected to resume operations in about two weeks.

Slag Problem

Will Be Discussed at Pittsburgh—Wheeling Withdraws Tariff

Pittsburgh, July 20.—The chamber of commerce of Pittsburgh has called a meeting for one o'clock tomorrow to discuss the proposal of railroads to charge 20 cents per ton for hauling slag from furnaces in western Pennsylvania, Ohio and West Virginia. The meeting will be followed by another one hour later at the chamber, between shippers and railroad interests. At the latter meeting the discussion of the chamber's action will be taken up and an effort to arrive at a better understanding than now exists, will be made.

The action of the Wheeling & Lake Erie in withdrawing its slag tariffs from the files of the Ohio utilities commission has been accepted by shippers as an effective argument against interstate slag rates becoming operative. These rates are now in effect in Pennsylvania and Ohio, but have been suspended in West Virginia. The Wheeling & Lake Erie is understood to take the position that it can use all the slag available from furnaces on its line and that a charge for hauling this material is not justified.

Shippers are also protesting against the proposal of railroads to file new tariffs with the interstate commerce commission to become effective in one day .

In the case of Ohio, the public utility commission, until a recent session of the legislature, did not have the power to change or suspend tariffs. At the recent session, full power to fix rates and to change or suspend any unjust or unreasonable rate was given the commission, but under the referendum clause of the constitution this act does not become effective until July 30. Hence there is nothing to prevent the railroads from collecting from Ohio furnaces the proposed 20 cents from July 13 to July 30. However, industries in Ohio, as well as in Pennsylvania, affected by the proposed tariff will file protests with the public service commissions of the two states.

Complaints probably will be made within a few days. The interstate commerce commission, it will be recalled, ordered proposed tariffs stricken from its files. The commission suggested that the railroads should prepare more specific charges than those outlined in the original tariffs. Industrial officials believed the slag hauling question had been settled for the present. They did not think an attempt would be made to charge for hauling slag and refuse within the boundaries of the several states affected.

Fifty Years of Success in Business

WHEN a man's business associates and friends gather in his office to help him to celebrate the fiftieth anniversary of the day he first entered into business, it is an occasion deserving of more than usual notice.

But when the man happens to be W. L. Brown, Pickands, Brown & Co., Chicago, and his office is filled with beautiful flowers sent by admiring friends and he is the recipient of magnificent presents of many kinds from those anxious to contribute to the joy of the anniversary, as was true on July 10, it becomes still more of an event. Unless one were told, it would be hard to believe that the genial, active, wiry individual, who is master of every detail every day of a large number of enterprises that are supervised by him, has been on the job that length of time. Keeping fully abreast with all of the important events of the day, his judgment upon a business matter is recognized as being as unerring as the 150-yard drive he gives to a golf ball and the result in each case almost bound to be equally infallible. Born in 1842, he began as a clerk in a board of trade commission house in Chicago when he was 15 years old, enlisted in the Chicago mercantile battery, light artillery in 1862 at the age of 20, serving actively until 1865, coming out as quartermaster sergeant, seeing action at such places as Vicksburg, Jackson, Miss., Galveston, Red river expedition, Mobile, etc. At the close of the war, he entered the office of A. B. Meeker, a dealer in iron and coal in Chicago, as a bookkeeper. Five years later, or in 1870, he was a partner, and in another five years, or in 1875, he bought out Mr. Meeker's interest, and in 1883 organized the firm of Pickands, Brown & Co., with Major H. S. Pickands, Col. James Pickands, Samuel Mather and Jay C. Morse as partners.

WILLIAM LISTON BROWN

Mr. Brown was later active in the affairs of the Illinois Steel Co., but at the time of the consolidation gave up that, as well as other interests, to devote all of his time to his own business affairs.

He was an organizer and president of the Chicago Ship Building Co., later president and chairman of the board of directors of the American Ship Building Co., president of the Federal Furnace Co., a director of the First National Bank in Chicago, a director of the First Trust & Savings Bank, the Lackawanna Steel Co., the By-Products Coke Corporation, as well as a number of other furnace interests, iron mines, steamship companies, etc. A list of Mr. Brown's other activities would occupy too much space even if they could be found out, which is doubtful, because he is of such an unusual, modest type that a disclosure could not be forced with a bar of dynamite. It is a question if there is a single man in America who at his age is as active on the firing line, who keeps track of his own business and of the many important enterprises entrusted to his care so closely and who is apparently so determined to stay at the head of the procession for many years, as is W. L. Brown. The number of incidents that are related by men now eminently successful, of the extent to which they are indebted to this gentleman for important assistance cheerfully given at critical times during their business careers, would fill a book of itself and would include some names that have been known not only in every corner of this country, but of the whole world. But of all this again this exceedingly modest man refuses to talk—just smiles and looks happy.

Very Friendly

To Business is Attitude of Federal Trade Commission

Chicago, July 20.—A most friendly attitude toward "big business" is manifested by the federal trade commission, which held sessions in Chicago Monday and Tuesday of this week. The hearings are confined at present to lumber dealers, but the attitude of the commissioners is of interest to all business which has suffered from the sword of the Sherman law hanging over its head.

John H. Kirby, of Houston, Tex., an exporter of lumber, caused the commissioners to question him closely when he drew a picture of American exporters paralyzed by fear of federal prosecution while Canadian lumber dealers can form combinations to bring about efficiency in obtaining foreign business.

Commissioner George Rublee, of Washington, intimated that the Sherman law does not prevent combinations as far as foreign trade is concerned. Mr. Kirby responded that lumber men have been frightened by what has happened to combinations in other lines and have preferred not to take chances.

Chairman Joseph W. Davies, of Madison, Wis., asked Mr. Kirby to investigate in detail as to the Canadian method of combining for export business and present his facts before the commission later.

The following members of the commission are present at this hearing: Joseph W. Davies, of Madison, Wis., chairman; W. H. Parry, of Seattle, Wash.; George Rublee, of New Hampshire; Edward N. Hurley, of Chicago, and W. J. Harris, of Georgia.

Following the two days' session in Chicago, the commissioners will visit other cities and return to this city to open hearings again July 26.

Basic Products Co. Addition

The Basic Products Co., Pittsburgh, has let contracts for the erection of an addition to its works at Kenova, W. Va. The company manufactures dolomite and has an annual capacity of more than 50,000 tons. Because of increased demand, the company has decided to install what are described as two of the largest kilns ever used in the manufacture of dolomite. Additional equipment will give the concern an annual output of more than 125,000 tons. Work will be completed by Oct. 1. Officers of the company, which owns extensive dolomite deposits, are as follows: President, George S. Davison, secretary, Albert P. Meyer, and treasurer, Allen S. Davison. The sales are handled by the Allen S. Davison Co., with offices at 2514 Oliver building, Pittsburgh.

Many Cars

For Hauling Autos Enquired for by New York Central

New York, July 21. (By wire.)—Italian state railways have entered the market for 20,000 tons of rails and a tonnnage of billets. A New Jersey signal manufacturer inquires for 12,000 tons of bars for high explosive shells. New York Central lines put out today for bids 1,500 all steel automobile cars. The Southern railroad orders 4,500 more rails from the Tennessee company. Eastern mills are making still further advances in billets and some sales of open hearth carrying a dollar extra have been done at $34, mill. It is known, however, that some recent large tonnages were accepted at comparatively low figures.

Milliken has been awarded 2,000 tons for Panama pier, upon which the Pennsylvania was thought low.

Razing Old Stacks

Work has begun in tearing down the Nos. 2 and 4 stone blast furnaces of the Thomas Iron Co. at Hokendauqua, Pa., which have been abandoned for a number of years. The No. 2 furnace ceased to be active in September 1894, and the No. 4 furnace sometime prior to 1904. The latter furnace has boilers, blast mains and gas flues which will be scrapped. The No. 8 furnace of the Thomas Iron Co. at Alburtis, Pa., recently established a new high record of production. On July 15, it made 75 tons which is the largest daily output since the furnace was built in 1867 and 1868. The week's output was 500 tons. Previously 50 tons a day had been considered a good showing for the Alburtis furnaces.

Uniform Boiler Code

A committee representing the various boiler manufacturers' associations will organize within a few weeks to promote the general adoption of the American Society of Mechanical Engineers' boiler code. The movement to form this committee was initiated at the recent convention of the American Boiler Manufacturers' Association. The committee will have general supervision over the country-wide campaign to secure uniform boiler codes and laws.

Personals

W. M. McFate, formerly assistant sales manager of the Trumbull Steel Co., Warren, O., has been made assistant to President J. Warner. Paul Wick has been appointed assistant sales manager.

L. S. Love, formerly head of the L. S. Love Machinery Co., has associated himself with Sherritt & Stoer Co., Inc., dealers in machine tools, railway and machine shop equipment, 603 Finance building, Philadelphia.

William B. Phillips has been named president of the Colorado School of Mines, Golden, Col., and will assume his new duties on Sept. 1. He was formerly director of the bureau of economic geology and technology, at the University of Texas, Austin, Tex.

W. Spencer Robertson has been appointed secretary of the American Locomotive Co., with headquarters at 30 Church street, New York City, succeeding C. B. Denny, resigned. Mr. Denny also has retired as treasurer of the company.

E. T. Edwards, of the Vanadium Alloys Steel Co., Latrobe, Pa., and Frank Garrett, formerly identified with the Firth-Sterling Steel Co., McKeesport, Pa., are now associated with the Latrobe Electric Steel Co., Latrobe, Pa., which has completed plans for the manufacture of high speed steel.

Lawrence H. Underwood has been appointed superintendent of the Youngstown Sheet & Tube Co.'s by-product coke plant. Mr. Underwood comes from the Gary works, and was at one time blast furnace superintendent at the Riverside works, Wheeling, W. Va.

W. T. Partridge, who has had editorial charge of the iron and steel and metal market news of the *Journal of Commerce*, New York City, has resigned after a connection of a number of years, to devote himself to general writing in the lines in which he is well informed. Previous to handling this work in New York City, Mr. Partridge was editorial representative of the *Iron Age* at Chicago. He has a wide acquaintance among iron and steel men.

C. E. Drayer, whose publicity work in connection with the Cleveland Engineering Society has won him high commendation, has been elected secretary of that society, which now has a membership of over 800. Mr. Drayer has also been appointed secretary of a committee on engineering co-operation, of which Dr. Frederick H. Newell, professor of civil engineering at the University of Illinois, is chairman. Plans will be formulated by the committee to show how the engineer can promote public welfare.

Fig. 1—Panoramic View of Mt. Hope Surface Plant from the North

Develop Nation's Oldest Iron Mine

Empire Steel & Iron Co.'s Mount Hope Properties, Which Helped to Make Revolutionary Weapons, Become Leading Producers of New Jersey Iron Ore

BY H. M. ROCHE AND J. C. STODDARD

MT. HOPE iron mine, Mt. Hope, N. J., said to be the oldest operating iron mine in the United States, has recently been extensively developed, with a corresponding increase in ore yield and mining plant capacity. It is the property of the Empire Steel & Iron Co. and is now one of the principal workings of the upper New Jersey and lower New York iron field, which of late years has been largely exploited.

Mt. Hope mine has been worked since pre-revolutionary days. General George Washington visited the mine and neighboring forges during the war of independence to inspect the making from local ores of shot and cannon for his army. Hundreds of small iron kettles were furnished the Continental army from Mt. Hope ores. The ore deposit probably was discovered by white men about 1700, although arrowheads and utensils picked up in the neighborhood of the mine indicate that the New Jersey Indians knew of its location long before this. The age of the mine is not definitely known, but it is believed that ore was first commercially extracted from it between 1710 and 1722. It has been worked practically without pause since then to the present. The nearby Dickerson mine, at present inoperative, is known to have been active before 1715. Probably the Mt. Hope mine was worked at the same time. One of the shoots of ore originally projected above the earth in the form of a cliff 100 feet high, and through some peculiarity of shape, perhaps, gained for itself long ago the name of "great jugular vein". At that time, the mineral ran about 65 per cent in iron. Until the mine was actually surveyed and recorded in 1749, its ore was free to all. Early working of the property was done in primitive style, the operators backing up wagons to the projecting mass of rock, picking up the ore by hand and carting it to Dover, where a forge was situated in 1722. No forges were found at Mt. Hope because of its scarcity of water power, an essential in those days.

The history of Morris county, N. J., from 1739 to 1882 says that local mines were worked in 1685. The first smelting furnace and forge in New Jersey for converting iron ore into bar iron was built at Tinton Falls in 1682. It was followed by the Whippany forge in 1710, the John Jackson forge at Dover in 1722, and the Job Allen forge at Rockaway in 1730. It is likely that the Mt. Hope ore was used at Whippany, Dover and Rockaway forges, owing to its accessibility to these plants. The mine is 12½ miles from Whippany, 3½ miles from Dover and three miles from Rockaway.

Earliest recorded location of the Mt. Hope tract was made by Samuel Gardner in 1749. He sold the tract to Abner Beach, who in turn disposed of it to Col. Jacob Ford Sr. in 1750. On Feb. 28, 1768, Colonel Ford sold the property to his son, Jacob Ford Jr., who in 1772 leased it to John Jacob Faesch, and on May 10, 1792, conveyed it outright to the latter. On the death of Faesch the property passed to his son, who sold it on Sept. 25, 1809, to Moses Phillips Jr. In 1814, Phillips leased the property to the McQueen Co., which operated the mine until Nov. 29, 1831, when the Mt. Hope Mining Co. acquired the property. The Lackawanna Iron &

FIG. 2—AN IDEA OF THE MAGNITUDE OF MT. HOPE IRON MINE IS GAINED BY THIS VIEW FROM THE SOUTH

Coal Co. obtained control in 1852 by purchasing the majority ownership of Edward R. Biddle. The Empire Steel & Iron Co., the mine's present owners, bought it from the Lackawanna Iron & Coal Co. in 1889.

Location and Resources

Situated in the iron ore region of the New Jersey highlands, 38 miles northwest of New York City, the property is 2.7 miles long by 1.2 miles wide and contains approximately 1,600 acres. Ore bodies extend entirely through the property, parallel to its longitudinal axis, the holdings including 14,256 feet along the strike of the veins or lenses of ore. The mine is well served as regards railway transportation. Two roads, the Delaware, Lackawanna & Western and the Central of New Jersey, pass through Wharton, a town 3½ miles from Mt. Hope. Rail connection is made from Wharton to Mt. Hope by means of the Mt. Hope Mineral railroad. According to estimates made by various authorities, 3,000,000 tons of iron ore have been mined and shipped from the property from the time of its discovery to Jan. 1, 1912. Conservative estimates now place its present ore reserves at 10,000,000 tons, considering only the five ore shoots being actively worked. Taking into account the six ore shoots that have been worked on adjoining property and which undoubtedly extend into the Mt. Hope holdings, it is believed that these veins will furnish an additional 10,000,000 tons of commercial ore. With its present equipment and development, the Mt. Hope mine, it is estimated, can produce, for a period of years, 300,000 tons of ore a year. As described by the geological survey of New Jersey (vol. 7) and by the United States geological survey (folios 157-161-191), the highland area of New Jersey is made up chiefly of pre-Cambrian crystalline rocks, gneisses of uncertain origin, schists, crystalline limestones, granites and basic igneous rocks, which form a series of ridges and valleys of a general northeast trend, dipping steeply to the southeast, although they may strike and dip in other directions over small areas. Magnetite occurs in the gneisses, pegmatites and limestones, but the ore bodies associated with the gneisses have thus far proved the most important and valuable. The gneisses of the New Jersey highlands consist of approximately parallel layers of different varieties of gneiss, all of which exhibit a more or less well defined linear structure in the arrangement of their constituents. The layers of gneiss generally strike northeasterly, with a southeasterly dip, and pitch to the northeast at low angles, which range from 10 to 40 degrees. The ore occurs in the gneiss as layers, although not confined to any particular gneissic rock. Some of the ore layers are roughly elliptical in shape, giving rise to the term "ore pods", while others are of tabular form.

The terms "ore lenses" or "ore shoots" are generally used to describe both forms of ore bodies. The lenses are all conformable to the enclosing gneisses, one peculiarity of both gneiss and ore layers being their uniform pitch at low angles to the northeast.

At the Mt. Hope mine five parallel lenses of ore are being actively worked. They are the Taylor, Leonard, Elizabeth, Finley and Carlton. At least six other ore bodies within the property have not yet been developed or worked, except on adjoining ground. All of the ore mined is magnetic, although the various lenses differ markedly, with varying characteristics as regards shape, size and walls, although all have the same strike and pitch, with varying dips.

Character of the Lenses

The series of lenses at Mt. Hope dip with the dip of the associated gneiss, and pitch parallel to the pitch of their structure, with definite top and bottom limits. The rock overlying the lenses is called the "top" rock and that under the ore lenses the "bottom" rock. The lenses or shoots vary considerably in width and height, but along their pitch they persist for considerable distances. Mt. Hope ore bodies now being worked all outcrop on the property for varying distances. The length of the shoots along their pitch has not yet been determined, although developed by mine workings and diamond drill holes for 7,200 feet. Contrary to published opinion, the Mt. Hope ore lenses do not show pitch and shoot structure, at least to the degree claimed. The Taylor shoot has been described as "pinching" to narrow limits, with rich shoots of ore above and below these pinches. This shoot has well defined and fairly uniform walls, with an average height, measured along the plane of the vein, of 500 feet. It is tabular in form. At the bottom rock it is 25 feet wide, at the top rock 6 feet wide, and at no place do the walls close or pinch in closer than 5 feet. Analyses show the ore to be very uniform throughout, averaging 48 per cent in iron, which after magnetite separation, runs from 58 to 60 per cent. The so-called pinches were due to strike faults.

Thus far, but one large cross or dip fault has been found at Mt. Hope. Striking south 70 degrees east,

FIG. 3—BROWN SHAFT HOISTING AND LOADING PLANT

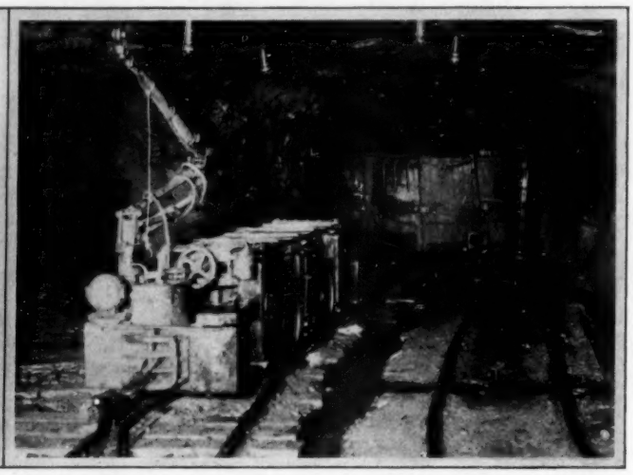


FIG. 4—CARS LOADING UNDERGROUND AT CHUTES, SHOWING ELECTRIC LOCOMOTIVE

it dips 60 degrees southwest, approximately at right angles to the strike of the ore bodies. The position of the fault on the property is about ¾-mile from the south boundary line. The Mt. Hope fault displaces the ore bodies vertically 340 feet, the down throw side being to the south. The offset of the Taylor, Finley and Carlton veins along their outcrop is 168 feet to the east. The Leonard and Elizabeth shoots do not outcrop in this part of the property.

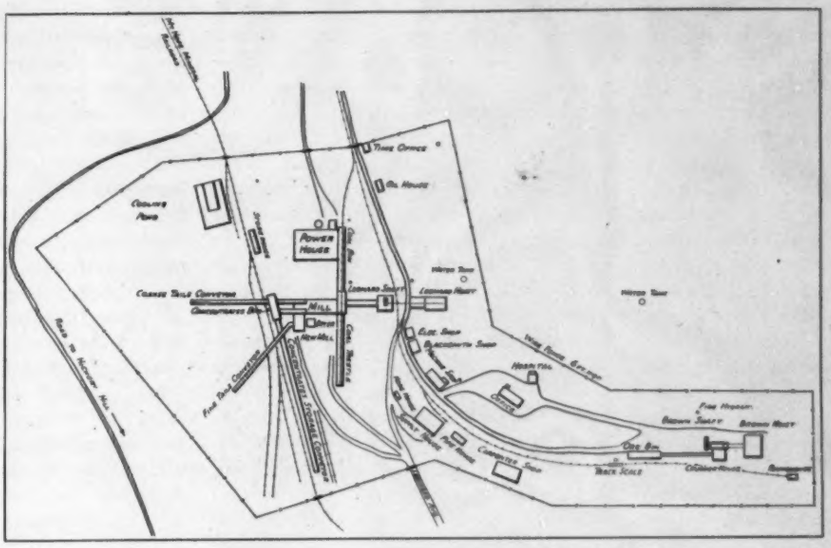


FIG. 5—PLAN OF SURFACE PLANT AT MT. HOPE

A peculiar form of "pinching" in the Leonard shoot is caused by the irregular rolls in the foot wall, the hanging wall maintaining its regular dip. The Elizabeth shoot shows the same foot wall irregularity in a less degree. The Leonard and Finley shoot exhibit apparently a folded structure. The Leonard, or southeast limb, is a thicker, more compact shoot, containing a coarse and blocky rich ore, while the Finley or northwest limb is a thin, tabular shoot with fine grained, much leaner ore. Another case of similar folding occurs at the Hurdtown mine, near Mt. Hope. The ore body at the Richard mine appears to curve so as to resemble a fold, and at the Hurd mine at Wharton an ore spur extends downward from the main ore body for a distance of 80 feet. Both the latter mines are very close to and lie in the same ore belt as the Mt. Hope mine. No doubt the irregular rolling foot wall of the Leonard shoot and the curved form of the Elizabeth shoot are due to this folding.

The entire surface plant at Mt. Hope has recently been remodeled and modernized and new equipment of the latest design added where necessary. Formerly it was the practice at this mine to operate several shafts on the different ore bodies and to equip each shaft with individual power plants. At the present time only one main hoisting shaft is used. In Fig. 5 is shown the surface layout. The entire surface plant is enclosed by a heavy small mesh wire fence, 6 feet high. Its one entrance is at the time office. The power plant is 76 by 98 feet. The boiler plant consists of four Babcock & Wilcox water tube boilers, with total capacity of 1,510 horsepower, made up of two 300-horsepower single deck and two 455-horsepower double deck boilers. All boilers are equipped with Foster superheaters, with steam pressure of 140 pounds and superheat of 100 degrees. Anthracite coal, rice size, is burned on Treadkill dumping grates in Webster furnaces. The ashes are dumped into large concrete hoppers, built as part of an ash tunnel. From the ash hoppers the ashes are run into cars and then elevated to the ash dump. Forced draft is supplied the boilers by means of 108-inch fans operated by vertical steam engines. Boiler feed water is preheated to 200 degrees Fahr. by a Cochrane open feed water heater using exhaust steam, and then pumped to the boilers by two 10 x 6 x 10 double acting Worthington boiler feed pumps. The engine room contains two Ingersoll-Rand Class "C" duplex corliss valve compound air compressors, steam cylinders 16 x 32 x 36 inches, air cylinders 17¼ x 28¼ x 36 inches, each of which has a capacity of 2,040 cubic feet of air, or a total of 4080 feet; one Allis-Chalmers horizontal corliss mill engine, cylinder 18 x 36 inches, belted to the main line drive of the concentrating mill; one Ideal simple automatic engine, cylinder 9 x 10 inches, direct connected to a 35-kilowatt 250-volt Bullock generator; one Terry steam turbine connected to a 30-kilowatt 250-volt Burke generator; and one Westinghouse 550-kilowatt mixed-pressure, condensing, direct-current, geared turbine, consisting of a 3,600-revolution per minute turbine geared to a 720-

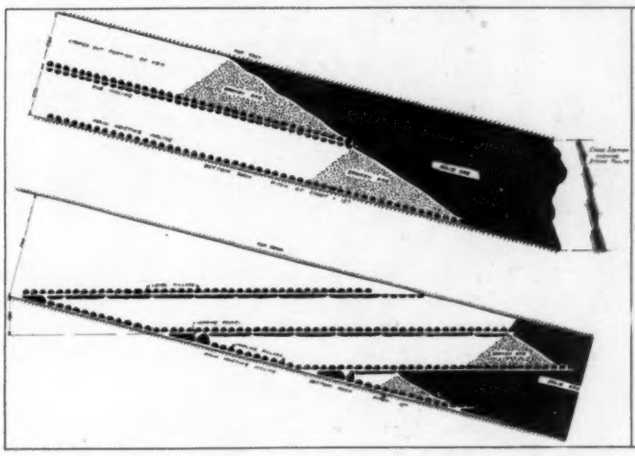


FIG. 6—METHODS OF STOPING AT MT. HOPE

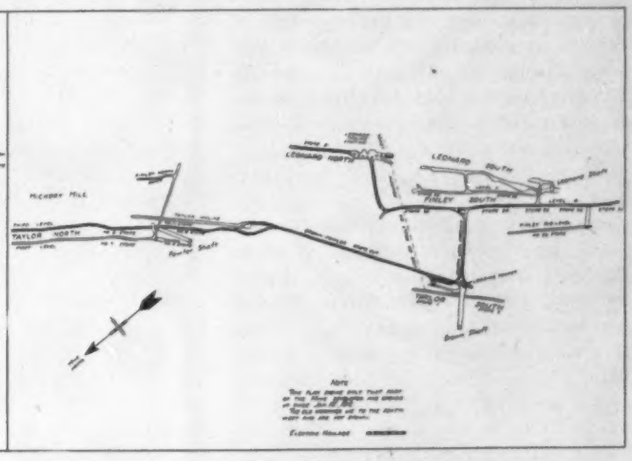


FIG. 7—PLAN OF MT. HOPE UNDERGROUND WORKINGS

revolutions per minute 500-250-volt, three-wire, direct-current, compound-wound generator through a 5 to 1 Westinghouse reduction gear. A 28-inch Bulkley barometric condenser is used in connection with the Westinghouse turbo. The water, after passing through the condenser, is repumped to the condenser by a centrifugal pump, with a capacity of 2,000 gallons per minute. This pump is operated by a 50-horsepower 500-volt motor. A secondary pump at the cooling pond is a Jeanesville centrifugal, with a capacity of 1,000 gallons per minute, operated by a 30-horsepower Terry steam turbine. The large amount of steam exhausted to the atmosphere under ordinary conditions at this plant is now used in running the Westinghouse mixed-pressure, turbo-generator set which furnishes electric power for the entire plant. Electricity is used as motive power for all machinery, except air compressors, air drills and the mill engine. All motors used are 500-volt motors except the underground electric locomotives, and these are 250-volt motors.

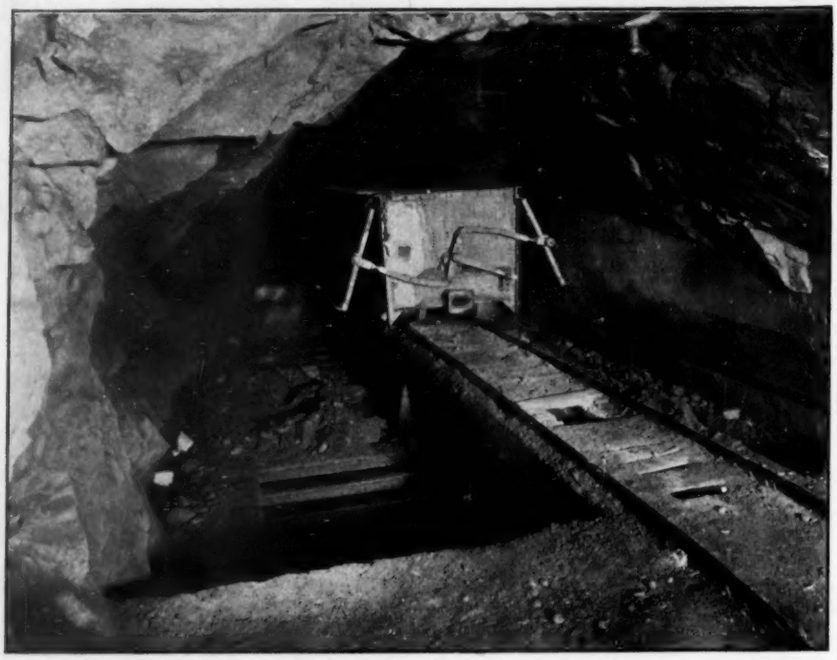


FIG. 8—CARS DUMPING ON UNDERGROUND GRIZZLIES

Interconnected Switchboards

An interesting feature of the power plant is the interconnected switchboards. For distribution of power there are two switchboards, a 500-volt and a 250-volt. The 500-volt service is used exclusively for motor power, while the 250-volt service supplies power for lighting, magnetic seperators and for some of the smaller motors. Although each system is independent of the other, an interconnecting switch is arranged on the 250-volt switchboard. By means of this the 500-volt, three-wire system is connected to the 250-volt busses. To obtain a balance load condition on this three-wire system, the feeder switches of the 250-volt switchboards are double throw, and by observing reading on the double scale ammeter connected in neutral wire, the unbalanced load is checked. With perfectly balanced load this meter reads zero. With this interconnecting arrangement between switchboards the smaller units can be shut down while the larger unit is in service. All electrical equipment was furnished by Westinghouse Electric & Mfg. Co., with exception of the two small generators. A new machine shop, 24 x 50 feet, has been equipped for making all repair work. It is operated by a 15-horsepower Westinghouse motor with a 15-horsepower auxiliary steam engine. A new three-story supply house, blacksmith shop, electrical shop, carpenter shop, ore sampling house, two-story office building and laboratory have been erected. A thoroughly modern first-aid room at the rear of the office is equipped with all conveniences. The Empire Steel & Iron Co. has a strong safety organization and pays much attention to this work. Safety work was first started at all the plants of this company a number of years ago, the company being a pioneer in that field. The February bulletin of the American Iron & Steel Institute gives a brief but most interesting description of safety work at the Mt. Hope mine during 1914.

All ore is hoisted through the Brown shaft by means of a double drum 250-horsepower Wellman-Seaver-Morgan electric hoist, which has a rope speed of 1,000 feet per minute with a net load of 3 tons. The hoist is operated by means of two 125-horsepower 500-volt motors through herringbone gears. The hoist is equipped with post brakes and Webster, Camp & Lane clutches, all operated by compressed air. The hoist is also equipped with a Wellman-Seaver-Morgan and Cutler-Hammer overwind device. This hoist raises 1,200 tons of ore from the 550-foot level per 8-hour shift, besides lowering and raising men and handling supplies. The hoist is housed in a concrete building, 42 x 52 feet, which has a strong trussed roof covered with 3-inch matched flooring, tar paper and corrugated iron sheeting. At the shaft collar a 65-foot steel head frame has been erected, as shown in Fig. 3. The ore when hoisted is first dumped into a 100-ton steel ore bin, part of the head frame. From this bin the ore is sent over a 4-foot pan conveyor to a 24 x 36 Farrel jaw crusher, where it is crushed to 4-inch size. From the crusher the ore is conveyed by a 24-inch Robbins conveyor to an 800-ton ore bin and after being weighed on Fairbanks track scales, it is taken to the concentrating mill in standard gage 110,000-pound steel double hopper bottom ore cars. The pan conveyor, jaw crusher and 24-inch belt conveyor are driven by a 100-horsepower motor located in the crusher house at the head frame.

The entire surface plant has been laid out to entail a minimum handling of material between the main shaft, power plant and mill. Standard gage railroad tracks connect all departments. Plans are being made for a modern change house for all workmen, to be erected close to the Brown shaft. The company maintains a large general store for its employes, nearly all of whom live on the property in company houses. Dwellings for 100 families are rented to employes at a small rate. Each house has a large garden. The company also has built a school house and church for the employes.

Underground Operating Methods

Before adoption of the present system of overhand shrinkage stoping at Mt. Hope, mining was carried on almost exclusively by the underhand method, which involved extensive timbering, loading of the ore into cars by hand and considerable danger to workmen. This method possessed the advantage, however, of enabling the ore to be hoisted as fast as it was

broken, thus making the mine pay for itself from the start. This was an important consideration when the work was being done under contract, as was frequently the case. The system was probably the only practicable one before the days of the stoping drill, in times when prices were high, suitable timber was plentiful and the ore was close to the surface. It is still practiced to some extent in several of the New Jersey iron mines, but at Mt. Hope it has been entirely superseded by the overhand system. This system is adaptable to steeply dipping deposits of moderate width, where the ore and wall rock are firm and where all the material broken in the stopes is hoisted as ore. At Mt. Hope the dip of the veins varies from 60 to 90 degrees, and the width varies from 6 to 30 feet.

When sufficient pillar area is left no trouble is experienced from caving walls while the ore is being recovered. The fact that the broken ore in this system takes the place of the supporting timbers in the underhand method, and that it also furnishes a working floor for the drillers, requires that considerable broken ore be tied up in the mine at all times. As a long ton of the ore will occupy from 8 to 10 cubic feet in place and from 13 to 15 cubic feet when broken, it is seen that while a stope is advancing from a level or incline to the one above, 5 cubic feet or about 38 per cent of the ore broken, will have to be drawn away to make room for further breaking.

This 38 per cent thus represents the production of the stope until it has reached its limit in height and the lateral advance begins, after which production can keep pace with the breaking, leaving a constant quantity of broken ore in the stope as an advancing pillar.

FIG. 10—UNDERGROUND BLACKSMITH SHOP

Fig. 6 illustrates two methods of attacking an ore shoot by the overhand shrinkage system. As the output by either method is directly dependent upon the capacity of the main incline hoisting plant, it is probable that the "incline and level" method is to be preferred when a maximum production is desired, that is, when the incline in question is called upon to produce a large part of the output of the whole mine. This condition is secured by having an ore pocket and measuring chute so situated that the skip can be instantly loaded and kept in continuous operation from the same hoisting level for the greater part of the time. It necessitates, however, an auxiliary loading and tramming installation and also requires that more ore be left as pillars than in the "sub-incline method". This latter method possesses the disadvantage of slower loading, due to the fact that all of the ore hoisted has to be drawn from the incline chutes, necessarily a slower proceeding than loading from a measuring pocket. The chutes are frequently blocked by large boulders and the greater part of the ore has to be worked through the chute by bars. The "sub-incline" method will probably be adopted when a sufficient number of inclines are opened up to compensate for the time lost in loading, as a minimum of pillars are required, fewer chutes are necessary, and the procedure is continuous to the depth of profitable mining. The sub-incline will be equipped with a small hoist to handle men, tools and supplies, thus relieving the main incline of all interruptions. A Wellman-Seaver-Morgan Co.'s single drum electric hoist is at present being used on the Taylor and Leonard inclines, also in sinking the Brown shaft. These hoists are of 75-horsepower rated capacity and operate under 500 volts.

Loading from stopes is done by two men at each chute, the ore being loaded directly into cars on the levels and into skips on the inclines. Owing to the large pieces of ore likely to be en-

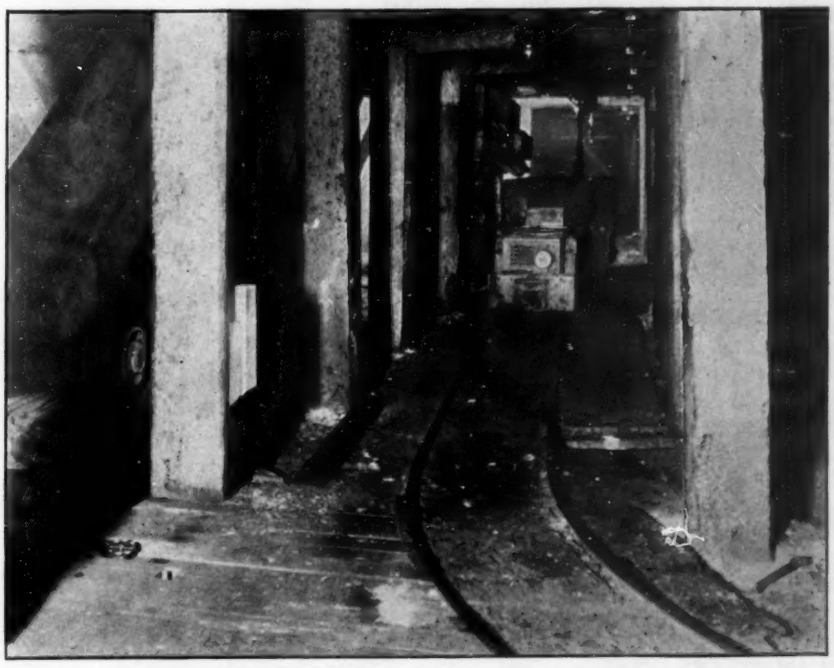


FIG. 9—TIMBERED STATION, ELECTRIC HAULAGE AND INCLINE SKIP

countered in the chutes, the speed of loading is dependent on the fineness to which the ore is broken in the stopes, above, so that every effort is made to blockhole these large pieces before they are covered up. Owing to the excessive weight of the ore and the necessity of handling it when very coarsely broken, only the heaviest construction can be used on all equipment.

The cars used in hauling the ore from the various working places to the shaft pocket are of the side-dump, hopper-bottom type, built by the Koppel Co., and are 65 cubic feet, or about 5 tons capacity. Baldwin-Westinghouse 4-ton mine locomotives running on direct current at 250 volts, furnish the motive power. A train normally consists of five cars with a total capacity of 25 tons, running on a grade ¼ per cent with the load. The total length of the electric haulage system on two levels is about 1 mile and is shown in plan in Fig. 7. In Fig. 4 is shown the locomotive, the arrangement of track and trolley wire, and a car being loaded from a level chute under a stope.

Open back skips are used on the inclines. They hold 5 tons and are arranged to be loaded either from chutes or from loading pockets. These skips discharge their load through an automatic dump into an ore pocket above the main haulage level, from which the ore is reloaded tnto cars. In Fig. 9 is shown a car ready to be loaded from the Leonard incline station pocket. The incline skip is seen to the left of this view. Owing to the extreme width of the vein at this station and the tendency of the roof to loosen and fall, the whole station was timbered with square sets on 8-foot centers, using 14 x 14 posts.

Horizontal grizzlies 28 x 14 feet in dimension and 3 feet below the track level, are installed on the main haulage levels where the ore is delivered from the cars to the main shaft pocket. Fig 8 shows a car over the fourth level grizzly. The door locking mechanism on the cars, as well as the T beam grizzly bars, can be plainly seen. These T beams rest upon three 20-inch I beams laid parallel to the track with their ends secured in solid concrete. Pieces of ore having their least dimension greater than 14 inches remain on the grizzly and are either sledged or blockholed until they pass through. This reduces all of the ore to a size that can be readily handled in the measuring pockets in the main hoisting shaft, as shown in Fig. 11. These pockets hold an even skip load of ore and can be instantly discharged when the hoisting skip comes to rest. The capacity of the main hoisting plant is sixty 3-ton skips per hour when hoisting in balance from a depth of 550 feet below the headframe dump. The skips run on 60-pound rails laid on 10 x 10 wall plates, which, in turn, are bolted to 10 x 12 stulls hitched into the walls of the shaft. Three compartments, 6 x 6 feet in the clear, extend from the surface to the third level, two being used for hoisting and the third for ladders, pipes and transmission lines. From the third level down a fourth compartment has been added to allow sinking to be carried on without interference with the main hoisting plant. In Fig. 11 is shown the arrangement for the disposal of the rock during sinking. A chute leads from the third compartment along the footwall to the side of the shaft, where the rock can be loaded into cars and used for stope filling. A drill sharpening and blacksmith shop is located on the third level close to the Brown shaft. This is illustrated in Fig. 10. Two mechanical sharpeners, a heating furnace, drill press, emery wheel, forge and workbench constitute the equipment. A Word Bros. drill sharpener does the bulk of the sharpening and a small Ingersoll-Leyner machine is used for shanking steel and for special purposes. The heating furnace uses non-sulphur coke fuel and runs on forced draft, the gases being piped to the surface. The installation of the sharpening plant underground has effected a great saving of time and labor and

(*Continued on page* 183.)

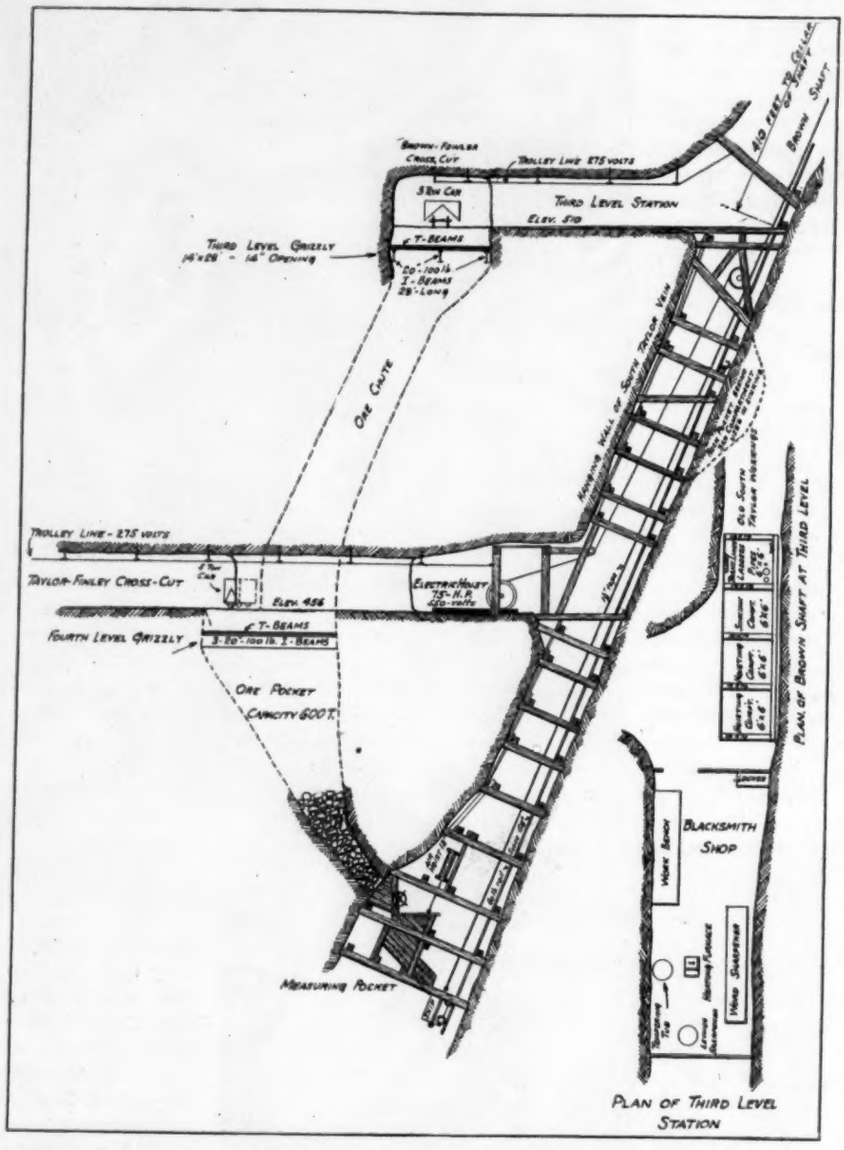


FIG. 11—SECTION THROUGH THIRD AND FOURTH LEVEL STATIONS, BROWN SHAFT

Electric Furnace in the Foundry

A Discussion of the Advantages of Electric Steel With Pointers on Furnace Operation

BY W. L. MORRISON

THE electric furnace for the production of steel castings is a subject of much discussion among the foundrymen of today. It will, no doubt, take some time before reliable and tangible data on its operation and upkeep may be available. All new apparatus must go through the experimental stage; and as is the case with every such apparatus, or article for the market, there are several new electric furnaces offered the public each year which only add to the confusion of the foundryman investigating the advisability of installing such a unit. It is not intended here to take up any particular make of furnace or to discuss relative merits, but the writer will try to point out some of the difficulties met with in practice, also the possible future of the electric furnace.

The electric steel furnace, coming to us from Europe, where it originated, received considerable development before it was introduced into this country. I do not mean by this that the electric furnace had reached its final stage of development, as it is far from that today. But the fact that the electric furnace was developed in Europe brought European practice, to a greater or less extent, with the furnace to the states. In certain practice and for some grades of steel European methods are excellent, and can be but little improved upon when the quality of steel is paramount. This covers for the main part crucible tool steel. There are so many items entering into relative costs between the crucible and the electric furnace method, that the electric refining of steel may be carried to a nicety and still produce steel lower in cost than can be produced by the crucible method.

The electric furnace in the foundry is a more difficult proposition on account of the keen competition in the steel casting trade. In Europe, raw materials, low wage scale and low power rates, lend themselves very readily to the production of the higher grade of steel castings in the electric furnace. I have been given to understand the electric furnace abroad is in competition with tonnage furnaces. In some localities in America electric steel castings are selling at a higher price than is asked for crucible steel. The customer as a rule prefers electric steel, but is reluctant to pay a higher price. For this reason those who install an electric furnace for the purpose of producing a higher grade of steel and who expect an increased selling price, are apt to meet with difficulty in keeping the furnace operating at capacity. The electric furnace is installed at present with the idea of replacing the crucible process, and making a better quality of steel. In many localities, and for numerous purposes the so-called Tropenas converter steel is replacing to a large extent crucible steel. Now the question is, can the electric furnace compete with the converter process? If the price of pig iron does not lower, the electric furnace is going to come into competition with the converter, but of course this will all take time.

I believe the future of the electric furnace in the foundry is insured by a close analysis of its operation, and the adaptation of its operation so as to cheapen the product and obtain a greater output. This can be done either with an acid furnace or basic furnace. For low carbon steels, less than 0.20 per cent, low phosphorus and low sulphur are not as essential as with the higher carbon steels. Under good operating conditions steel can be produced in the ladle from a two-ton electric furnace at from $20 to $30 per ton where no refining is necessary. This covers low carbon steels, 0.08 to 0.20 per cent. Taking three heats per day, with ordinary care the average cost of steel in the ladle should not exceed $30, even with power at 1.5c per kilowatt hour.

The demand at present for an alloy, or plain steel containing more than 0.40 per cent carbon is limited, for the heat treatment of steel castings on a large scale is also in its infancy, so to speak. This will be a branch of the steel casting industry in which the electric furnace will reign supreme, for in quality and soundness of casting it will supersede the crucible method. Steel can be melted and refined in the electric furnace for from $27 to $35 per ton in the ladle, depending on the power cost, cost of materials, and upon the carefulness of the melter. An electric furnace installed with the idea that one heat a day will pay its way is disastrous to the foundry. The electric furnace, while adapted to foundry work under certain conditions, should not be considered as an ordinary piece of apparatus. A careless melter can add $5 to $15 to the cost of a heat from electrode breakage, by neglecting to raise his electrodes during the removal of slag, or when charging the furnace.

In the charging of the furnace a certain amount of care must be exercised to insure prompt electrical contact and smooth working of the electrodes. I think the electric furnace involves more good common sense and observation than any of the well known methods of producing steel. It is very easy to lose an hour or even three hours by poor electrical contact at the offset, due to either poor charging, or poor selection of scrap. Those who have had practical experience with the furnace know how aggravating a poor electrical contact is; on the other hand a short circuit the moment the arc is made and subsequent surges of current are readily overcome by placing a little slag around the electrodes.

The operation of the furnace and the reactions taking place appear so simple that the ordinary spectator is apt to be misled. Without doubt the electric furnace is an ideal medium for carrying on the reactions necessary for the refining of steel. It is almost like carrying out a reaction in the chemical laboratory.

While very low carbon steel can be made and poured, much difficulty will be encountered, as is well known, if one attempts to pour any considerable amount of steel into small work from one ladle. If it is desired to make 0.10 carbon steel, small heats can be made in the electric furnace for very little increase in cost, although the ladle cost of course will run quite high. The making of this low carbon steel and getting it hot enough to pour light work, is done at the expense of the arch of the furnace, which necessarily calls for repairs oftener. Forced operations are also hard on the arch. Sharp corners, or angles should be avoided, it having been found that they cut very quickly. A plant warranting the installation of two furnaces, and operating one

Portions of a paper presented at the annual meeting of the American Foundrymen's Association, Chicago.

basic and the other acid bottom, would offer an ideal condition, where cheap, low grade scrap is available, melting and refining on the basic bottom, then using the scrap from the basic furnace in the acid furnace.

Electric Steel Stronger

The increased strength of electric steels of similar composition to those made by other processes has not been satisfactorily explained as yet. Even low grade steels made in the electric furnace similar in composition to the converter steels possess superior properties to converter steel. The fact that steel made in the electric furnace is in a reducing atmosphere seems a very plausible reason for the differences in properties. It has been demonstrated frequently that certain alloy steels made in the electric furnace of the arc type, could not be reproduced in the crucible furnace.

In both cases we have a reducing atmosphere. A suggestion as to this difference is that the intense local heating by the "submerged arc" produces certain carbides or combinations of carbides and alloys of the other ingredients in the steel which are not fully understood today. The fact that electric steel has less of segregation tends to show a greater uniformity and stability of iron alloys exist when produced in the arc furnace. This fact also helps to explain the superior properties of electric steel castings.

Efficiency

The efficiency of the electric furnace depends upon three important factors: The electrical design, metallurgical design, and the operation.

The electrical design is perhaps the most important, and is the hardest point for the foundryman to decide upon. We hear much talk about kilowatt consumption per ton of steel in the ladle, and because one furnace shows a lower kilowatt consumption than another, it would lead you to think it the more economical to operate, but in reality the power cost might be greater despite the lower kilowatt consumption. The reason for this is that the power factor enters into the power question, and is very important in connection with electric furnaces. A load with a low power factor is very undesirable at the central station, and most electric distributing companies have a penalty for low power factors. If the electric company would allow a low power factor, it would be to the advantage of the consumer operating an electric furnace, to use a furnace with a low power factor as the output would no doubt be greater per kilowatt hour. There are furnaces operating today with a power factor of from 90 to 97 per cent, while other furnaces on the market have a power factor as low as 40 to 60 per cent, and in order to raise their electrical efficiency they would need special apparatus, or should be operated by special alternators having a low frequency.

The power consumption of furnaces should be expressed in kilovolt-amperes, so the figures given in technical literature would be less misleading. Take, for example, the submerged arc type of furnace, with either the three-phase or the single-phase, operating under similar conditions. Generally speaking the higher the power factor the less will be the kilovolt-ampere consumption.

The metallurgical design of the furnace should be such as to conserve the heat generated by the electric arc, and facilitate the operation and repairs of the furnace. The design of the furnace for the conservation of the heat, etc., depends to some extent upon the melting stock available, and the quality of the steel to be made, that is, whether an acid bottom or a basic bottom be employed. The acid bottom is limited in its scope of operation, for while it produces a very good steel, the refining cannot be carried as far as on a basic bottom. The basic bottom is one more commonly used and will be considered in this paper.

The methods of lining the furnaces are all similar, and an experienced melter exercising ordinary care can put in a good bottom. The basic furnace must have sufficient openings to facilitate the charging, working of the heat, and carrying on the necessary repairs at the end of the heat. Some furnaces have very scant openings, designed for the conservation of the heat, but the operation is materially retarded, and the designer unconsciously lowers the efficiency. Nearly everyone connected with electric furnaces realizes the advantage of continuous operation, especially if the power is purchased under contract. The repair overhead per ton of metal is lessened and the thermal efficiency greatly increased.

The question of choice of material for electrodes for use in a small furnace, is a somewhat vexed one at the present time. To meet the need of large electrodes the amorphous carbon electrodes are being greatly improved and are replacing the graphite electrodes in the larger furnaces. The recent developments in the manufacture of amorphous electrodes enables the splicing of two sections, and spawling is greatly decreased. The graphite electrode is still extensively used in this country, and if it were not for the great cost (about three times that of the amorphous carbon) it would be used much more extensively on account of superior advantages it possesses. Its chief advantages are the ease of machining and strength of the joint between two sections, the high electric conductivity, uniformity of composition, and slower oxidation under oxidizing conditions. Generally speaking, in small electric steel furnaces, three tons capacity and less, operating intermittently, the cost of electrodes per ton of steel in the ladle is a little in favor of the graphite.

Amorphous Electrodes Preferred

On the larger furnaces I understand the large amorphous electrodes are more satisfactory and cheaper per ton of steel made. There is little practical data on the relative merits of the two electrodes, except regarding their thermal and electrical efficiencies.

The larger amorphous carbon electrode gives better distribution of heat to the steel bath, and offers some protection to the arch of the furnace. The grouping of graphite electrodes has been largely replaced by the single amorphous carbon electrode. At present the size of graphite electrodes is limited to 8 inches diameter, on account of difficulties encountered in graphitizing those of larger diameter. The only limit to size of the amorphous carbon electrode is that which will carry safely when the furnace is tilted or during operation.

Operation of the Furnace

Producing good steel economically depends largely upon the melter. While a steel melter can be trained for the electric furnace in a shorter time than for the open-hearth, this fact is too often abused, with the loss of heats and cold steel in the ladle. Then, too, often the furnace is blamed for the results when the melter is really to blame. Only a short time ago when the manager of a large crucible steel plant investigated the operations of a certain electric furnace, he saw several cold heats of steel poured, and decided the furnace was not adapted to his class of work.

When it is desired to produce a large tonnage of soft steel, that is, 0.12 to 0.15 per cent carbon, excellent results may be obtained by the use of one slag, lowering the carbon to near the desired point, and recarburizing, without attempting to whiten the slag. With the proper additions of alloys the steel will pour very fluid and sound castings will result. However, the iron oxide must be used quite spar-

ingly for decarburizing, 50 pounds to the ton of scrap usually being sufficient. Steel made this way is not quite so high grade as that made in the usual way, but it can be produced 10 to 25 per cent cheaper. The basic bottom can be used to compete with the acid lined electric furnace, by limiting the refining.

In the making of low carbon steel I find that a fairly fluid slag near the finish of the heat, gives hotter steel, a better cast, and less tendency to skull in the ladle. The demand among the jobbers for a low carbon steel casting seems to be increasing, being more of a fad than an actual necessity.

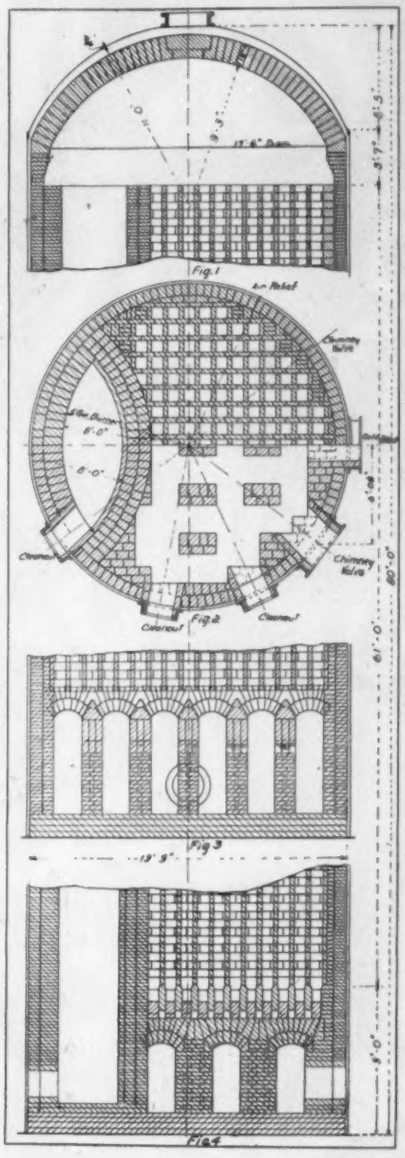
Attempting to make steel castings less than 0.10 per cent carbon, except for special purposes, I consider detrimental to the steel casting trade and especially to the future of the electric furnace. The cost of producing this steel is increased at the furnace, in the foundry, and perhaps one can add, in the cleaning department. The higher temperature required to maintain a fluid metal, necessitates an added repair cost, and heavier overhead on the furnace. In the foundry larger shrink heads are required, and there is greater danger from misrun castings lowering the efficiency in the foundry. The gates and risers on the castings are harder to remove where the carbon is low. This is very noticeable, even with the oxy-acetylene torch. For the great bulk of small work some foundries are considering raising the carbon content and paying more attention to the annealing. Without doubt there would be economy in the casting and the cleaning, and perhaps the customer would get a steel better adapted to his purpose.

The Michigan Bolt & Nut Works has issued a booklet of safety instructions in vest pocket size for the benefit of its employes. The first few pages are devoted to a special appeal for co-operation on the part of the employes, together with suggestions to the foreign workmen that they learn the English language and become American citizens. These suggestions are printed in several languages, so that all of the employes may understand them. The booklet also contains a very careful compilation of safety rules and suggestions. In addition, blank pages are provided for safety memoranda.

It is not the stockholders, the president or the claim agent who is getting hurt. It is the man on the job. For that reason, progressive companies are nowadays equipped with safety plans, safety devices and a safety organization.

Designs Hot Blast Stove

A hot blast stove, arranged so that checkers may be removed and replaced without disturbing the back wall or bridge wall, has been designed and patented by P. J. Brown, president of the P. J. Brown Construction Co., Cleveland. An outer wall of 9-inch brick completely encircles the stove, enclosing the checker work and



BROWN HOT BLAST STOVE

combustion chamber, and supporting the dome. In order to permit independent expansion, the checker brick is not bonded into the wall. Piers supporting the lower arches are spaced to give free access for cleaning.

The arches suporting the checker work are designed to combine strength with freedom from vibration, so as to avoid danger of displacement of the arches. Checker walls are of 6 x 9-inch standard straight brick laid on its 3-inch face, with alternate courses running at right angles. This gives a 9-inch square checker with a 3-inch checker wall, in accordance with the theory that the checker wall should be as thin as consistent with structural strength. With the exception of shapes in the arches and dome, the entire stove is constructed of standard size brick, 3 inches thick. In the accompanying illustration, Fig. 1 shows a vertical section through the top of the checkers and dome, Fig. 2 a cross section through piers and checker work, and Fig. 3 a vertical section, illustrating the construction of the upper arches. Fig. 4 shows a vertical section of the stove through the cold blast, depicting the construction of the lower arches resting on piers.

The Armstrong Cork Co. and the Armstrong Cork & Insulation Co., Pittsburgh, are making a joint exhibition of their products in the palace of manufactures at the Panama-Pacific Exposition, San Francisco. These companies state that there is probably no substance in universal use about which there is such a general misconception as cork, and therefore their exhibit has been designed more for its educational value than its commercial appeal.

The entire cork industry has been thoroughly covered and explained and samples of the many different forms of manufactured cork are displayed. Special forms of heat insulating cork for covering pipe, boilers, furnaces, etc. are shown.

The S. Obermayer Co., Chicago, has issued a 4-page pamphlet on boiler graphite, under the title "An Ounce of Prevention Worth a Pound of Cure." The boiler graphite manufactured by this concern is described and suggestions for its use are offered. The pamphlet states that the graphite is non-corrosive and is not acted upon by acids or alkalies. It is said to be a pure amorphous material, free from oil and tests have indicated that it prevents the formation of scale. It is suggested that a mixture consisting of graphite, boiled linseed or carbon oil and a small quantity of litharge will give satisfactory results.

To prevent accidents we must thoroughly understand their causes. Every danger point in every machine and in every process must be located and definitely grappled with. It is important to report accidents, but it takes less time to prevent them. Two minutes' work or care will often prevent an accident that would lose a man days from work.

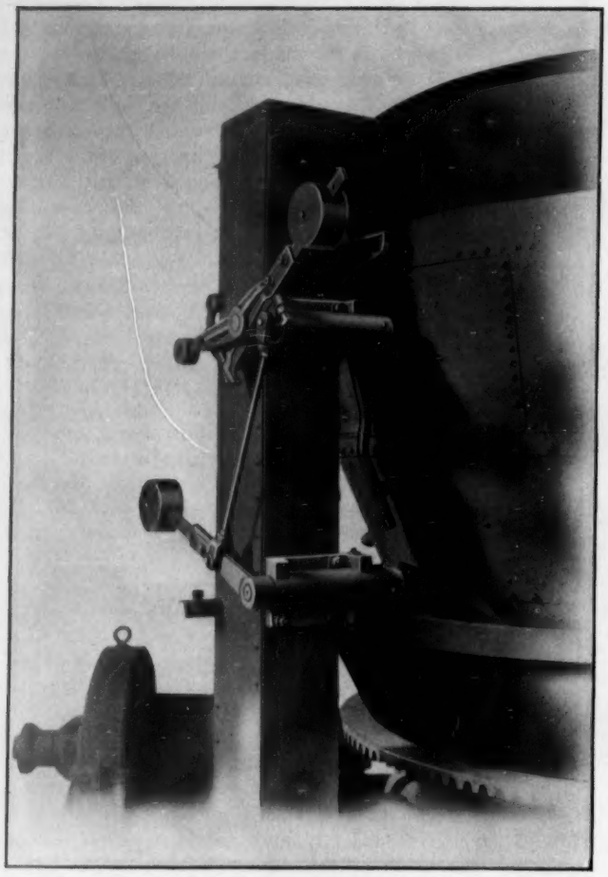


FIG. 1—PLOW STOP AUTOMATICALLY RAISED EXCEPT WHEN DISCHARGING ASH

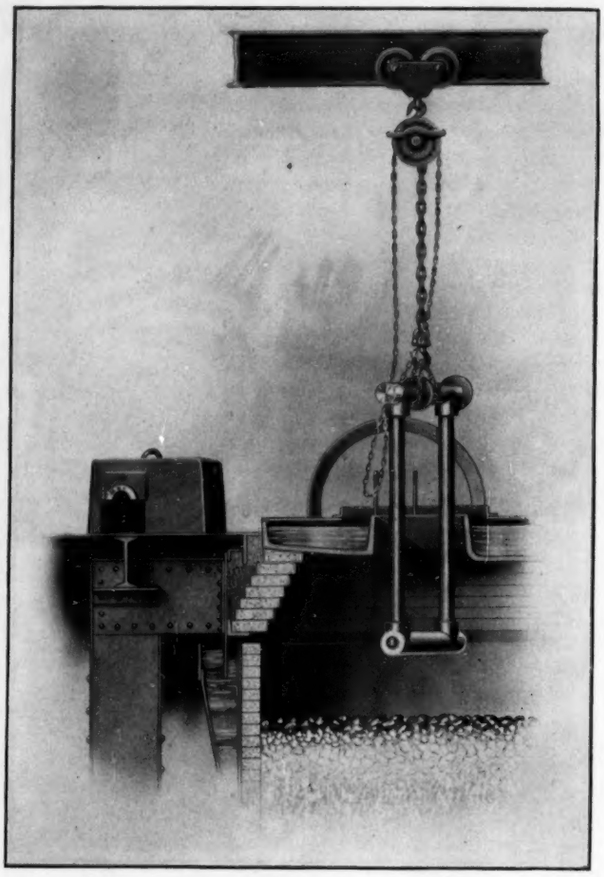


FIG. 2—FUEL LEVELER CAN BE CHANGED IN 20 MINUTES

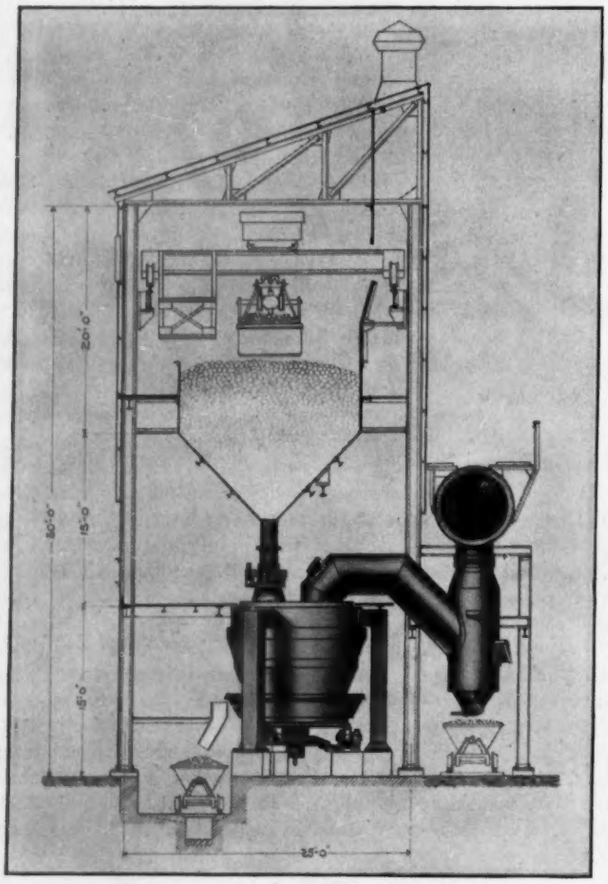


FIG. 3—ARRANGEMENT OF OVERHEAD BUNKERS, FEEDER, ASH SPOUT AND CAR, GAS OUTLET, HEADER FLUE AND SOOT COLLECTOR

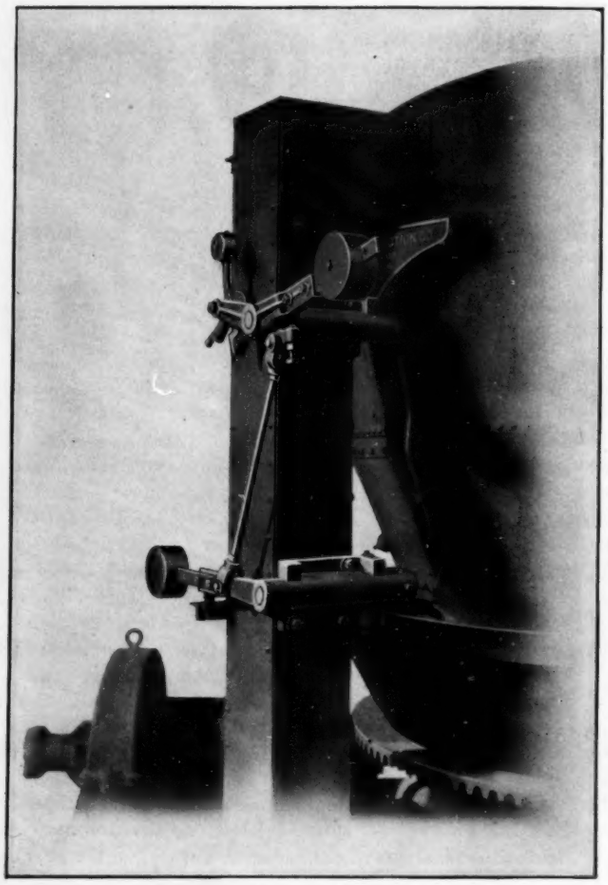


FIG. 4—PLOW HELD STATIONARY TO DISCHARGE ASH

New Design of Morgan Gas Producer

Gas Making Fire Not Disturbed—Special Provisions for Proper Feeding and Spreading of Coal, Removing Ash and Distributing Blast

THE engineers of the Morgan Construction Co., Worcester, Mass., began work some time ago upon a new producer gas machine, designed along lines radically different from previous practice. The basic idea in the design of gas producers during recent years has been the necessity of providing for the mechanical poking or breaking up of the fuel bed in order to make gas. This belief led to the introduction of many ingenious devices for disturbing the fire mechanically. The Morgan Construction Co., however, after considerable experimentation with this type of producer, became convinced that it was entirely feasible to design a gas producer which would convert a larger quantity of coal into gas without mechanical disturbance of the fuel bed and without manual labor. The company's engineers expected to obtain this result by the proper feeding, spreading and leveling of the coal and removal of the ash. The new Morgan gas producer, as shown in the accompanying illustrations, embodies a number of radical changes in design. Proper spreading of the coal is secured and the surface is continuously leveled. The leveler, as shown in Fig. 5, floats on the fuel and permits any practicable variation in height. As pointed out previously, the underlying principle followed in developing this producer gas machine has been that the gas making fire must not be disturbed, as it was believed that every agitation caused variations of density which create hot places and consequently inferior gas and clinkers. The result has been the designing of a producer gas machine which will convert 3,000 pounds of coal per hour into gas without hand labor. Of almost equal importance with the leveling of the top of the fire is the proper removal of the ash. This action, in the Morgan producer, is automatic. The entire bottom of the ash pan is swept by a spiral-shaped bar or plow, resulting in a uniform

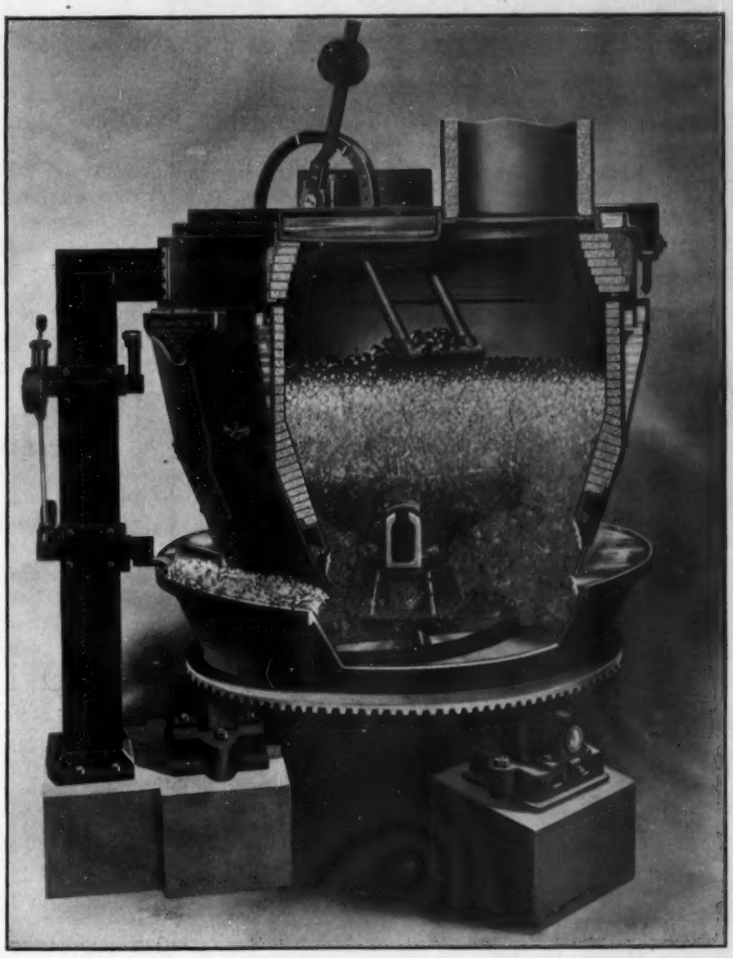


FIG. 5—NEW MORGAN PRODUCER GAS MACHINE

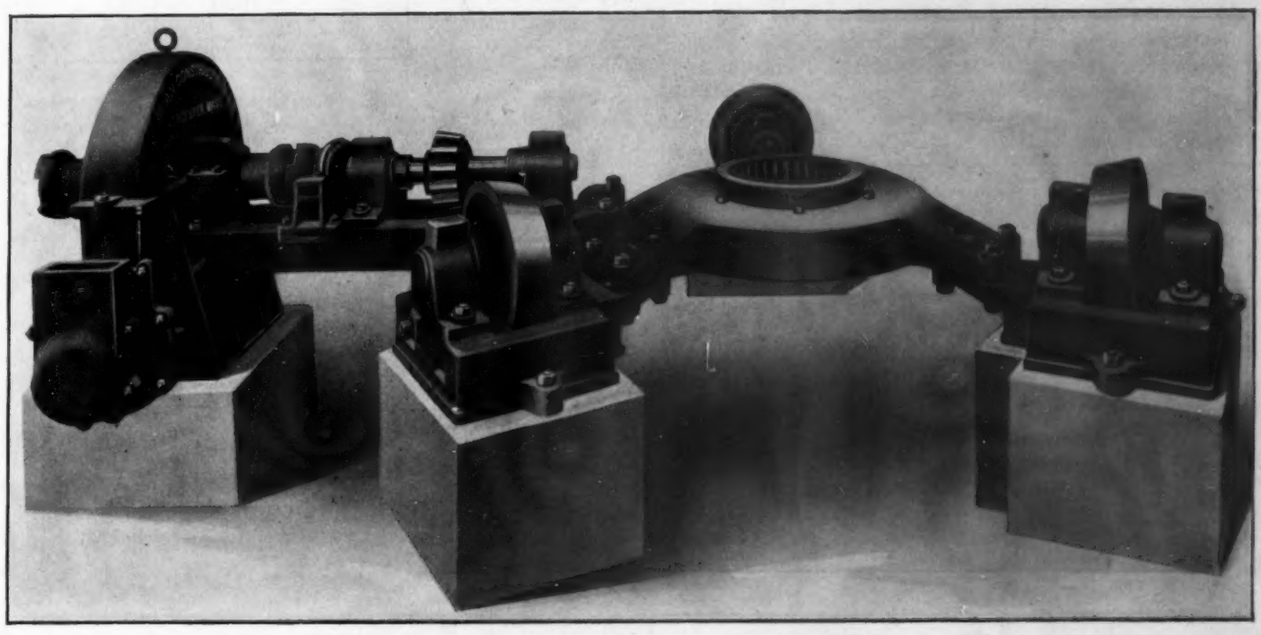


FIG. 6—THREE-POINT SUPPORT LOADS EACH WHEEL EQUALLY

Table I.

ANALYSES OF 12-HOUR CONTINUOUS GAS SAMPLES.

Date.		CO_2	C_2H_4	CO	H_2	CH_4	—B. T. U.— U. S. Steel Standard	Total 32 deg. Fahr.
Feb. 2, 1914.	Day.....	3.0	0.5	26.3	11.3	4.9	169.0	190.0
	Night.....	3.2	0.6	25.4	12.6	1.3	138.0	156.0
Feb. 3, 1914.	Day.....	2.8	0.7	28.7	12.9	2.2	159.5	179.5
	Night.....	3.0	0.4	27.8	11.7	3.7	162.5	183.0
Feb. 4, 1914.	Day.....	2.5	0.5	29.2	11.2	4.1	170.5	192.0
	Night.....	2.7	0.5	26.7	10.5	4.8	167.0	188.0
Feb. 5, 1914.	Day.....	2.7	0.5	26.9	10.5	3.7	157.5	177.0
	Night.....	3.0	0.4	27.5	11.7	3.4	158.5	178.0
Feb. 6, 1914.	Day.....	2.5	0.7	27.2	11.4	4.0	167.0	188.0
	Night.....	2.9	0.7	28.6	11.4	3.8	169.5	191.0
Feb. 7, 1914.	Day.....	3.0	0.8	26.7	10.5	4.2	166.0	187.0
Average.....		2.8	0.6	27.4	11.4	3.6	162.0	182.5
Feb. 9, 1914.	Day.....	3.0	0.3	25.6	10.5	4.6	158.5	178.5
	Night.....	2.7	0.6	25.8	11.4	2.4	149.0	168.0
Feb. 10, 1914.	Day.....	3.0	0.8	28.0	11.7	3.0	162.5	183.0
	Night.....	3.5	0.4	26.4	11.7	3.3	154.0	173.5
Feb. 11, 1914.	Day.....	2.5	0.8	27.2	11.4	4.0	168.0	189.0
	Night.....	2.8	0.4	27.2	11.4	2.8	151.5	170.5
Feb. 12, 1914.	Day.....	2.4	0.5	28.2	11.4	3.9	166.0	187.0
	Night.....	3.0	0.8	27.5	11.7	1.6	148.0	166.5
Feb. 13, 1914.	Day.....	2.5	0.6	28.5	9.3	4.2	165.5	186.0
	Night.....	3.0	0.8	27.4	11.7	2.9	160.0	180.0
Feb. 14, 1914.	Day.....	2.8	0.7	28.0	10.2	4.1	167.0	188.0
Average.....		2.8	0.6	27.3	11.1	3.4	159.0	179.0

settling of ash over the entire area. When the operator desires to remove the ash he sets a lever, and the plow is held stationary during one complete revolution of the ash pan, and is then automatically released. The ash is discharged at one point into a conveyor or car. Since the walls are free from obstructions and there is an absence of agitation, the coke is undisturbed and its temperature maintained until the coke is consumed. The operation of the plow is illustrated in Figs. 1 and 4. Regular feeding of small quantities of fuel is secured through the use of a feeder, as shown in Fig. 3, which delivers the coal direct from the overhead bins, onto the fuel bed at frequent intervals. The work of the operator is confined to regulating the speed to correspond approximately with the demand for gas. One operator, it is said, can take care of a battery of six machines, gasifying nine tons per hour. As shown in Fig. 3, the operating parts of the feeder are extremely simple. They are located entirely outside of the gas chamber, where they may be readily inspected. Provision is made against breakage when large pieces of iron, etc., accompany the coal. The design also permits the handling of coal as large as 4-inch cubes.

To secure an even distribution of the blast over the entire gas-making area, the blast is delivered from three hollow radial arms and around the whole circumference of the hollow ring or mantel. The result is a gentle sustained pressure evenly distributed over the whole surface so that each square foot of fuel bed is gasified at the same rate.

In order to avoid the difficulties encountered when the inner surface of the fire bricks become sufficiently hot to fuse with the ash from the coal, causing large clinkers to attach themselves to the walls, the design of the fire brick lining was given especial attention. The thickness of the fire brick was reduced and it is surrounded with a water jacket which keeps it cool enough on the inner surface to prevent any slagging action.

Since its introduction, the Morgan producer gas machine has undergone a number of severe tests under actual working conditions. One of the earlier machines was installed by a leading steel company and continuous 12-hour samples of the gas were taken day and night for several weeks. The representative analyses, which are given in Table I, were made by the works' chemist and are noteworthy on account of the low-carbon dioxide (CO_2) and the regular quality of the gas.

During part of this period, an accurate account was kept of the quantity of coal gasified. The average was 2,766 pounds of coal per hour for 120 hours with gas of 178 B. T. U., as shown in Table III. In Table II is shown the analyses of eight-hour continuous gas samples taken where open hearth furnaces were operated.

Table II.

ANALYSES OF 8-HOUR CONTINUOUS GAS SAMPLES.

Date.	CO_2	C_2H_4	CO	H_2	CH_4	—B. T. U.— U. S. Steel Standard	Total 32 deg. Fahr.
Sept. 21, 1914.....	3.5	0.9	28.8	12.3	2.6	165.0	185.5
Sept. 22, 1914.....	3.3	0.9	29.9	12.2	2.6	168.5	189.5
Sept. 23, 1914.....	3.1	0.9	30.1	12.9	2.4	169.0	190.5
Sept. 24, 1914.....	3.2	0.8	29.2	11.1	2.6	161.5	181.5
Sept. 25, 1914.....	2.8	0.9	29.9	12.6	2.6	169.5	191.0
Sept. 26, 1914.....	4.0	0.8	27.6	12.4	2.7	160.5	180.5
Average.	3.3	0.8	29.2	12.2	2.6	166.0	186.0
Average, Sept. 8-12.....	3.5	0.7	29.8	11.6	2.7	165.5	185.0
Average, Sept. 14-19.....	3.6	0.8	28.7	12.1	2.6	163.0	183.0
Average, Sept. 28-Oct. 3..	3.3	0.8	29.2	11.9	2.7	164.5	184.5
Average, Oct. 5-10.....	3.7	0.9	28.7	12.0	2.7	164.0	184.0

Table III.

QUANTITY OF COAL GASIFIED IN CONTINUOUS OPERATION.

Date.		Average lbs. coal per hr.	Average B. T. U. per cu. ft. of gas. U. S. Steel Standard.	Total 32 deg. Fahr.
Feb. 9, 1914.	Day	2,800	158.5	178.5
	Night	2,740	149.0	168.0
Feb. 10, 1914.	Day	2,740	162.5	183.0
	Night	2,690	154.0	173.5
Feb. 11, 1914.	Day	2,740	168.0	189.0
	Night	2,690	151.5	170.5
Feb. 12, 1914.	Day	2,800	166.0	187.0
	Night	2,860	148.0	166.5
Feb. 13, 1914.	Day	2,800	165.5	186.0
	Night	2,800	160.0	180.0
Average		2,766	158.5	178.0

These samples were taken practically every day and the records cover a period of five months, the average being 3.5 per cent carbon dioxide (CO_2), 28.8 per cent carbon monoxide (CO), and 182 B. T. U. Table II shows the analyses for one week and the average analysis for four other representative weeks.

In an effort to determine on what gasifying capacity they could safely rely as a guide to future requirements, the same owners recently increased the rate to 3,260 pounds of coal per hour. It finally was decided to rely on a working capacity of 3,000 pounds per hour. The results obtained by their experiments are shown in Table IV. The power required for operating

each machine is ¾-horsepower at the driving gear, excepting for 15 minutes during each 12 hours, while plowing ash, when this is increased to 1½-horsepower. Actual measurements taken for several weeks show a consumption of 1/6-pound steam per pound of coal. All of the bearings are provided with bushings to facilitate renewals, are protected from dust and dirt and positively lubricated. All of the operating parts are designed in accordance with the company's rolling mill practice.

Develop Nation's Oldest Iron Mine

(*Continued from page* 176.)

has eliminated the cause of many expensive interruptions to the hoisting service.

An Aldrich vertical quintiplex electric pump, installed at the bottom of the Brown shaft, pumps to the surface from the main sump, where all of the mine water is collected. The pump has a capacity of 600 gallons per minute, working under a head of 540 feet, and is operated by a 100 - horsepower variable speed motor geared directly to the pump through herringbone years. An auxiliary pump which can be run either by steam or air is installed in the pumping station and is intended for use in the event of a breakdown to the main pump or the electrical system.

The average crude ore as hoisted contains 42 per cent to 48 per cent Fe with phosphorus varying from 0.40 to 1 per cent, and this ore is concentrated on magnetic separators before shipment. The concentration eliminates part of the silica and phosphorus, so that the ore as shipped contains 58 per cent to 60 per cent iron and 0.550 per cent to 0.650 per cent phosphorus. Analysis of average ore shipments are as follows:

Element.	Per cent.
Metallic iron, dried at 212 degrees Fahr.	58.000 to 60.000
Phosphorus	0.550 to 0.650
Sulphur	0.042 to 0.055
Manganese	0.025 to 0.500
Silica	8.000 to 10.000
Alumina	1.250 to 2.000
Lime	2.500 to 3.000
Magnesia	1.500 to 2.000
Copper	0.000 to 0.000
Titanium	trace to 0.350
Vanadium	0.035 to 0.075

"Stop! Look, and Listen"! are three great rules for safety to which might be added "Think"! for absolute precaution from danger.

Book Reviews

Materials of Construction, Their Manufacture, Properties and Uses; by Adelbert P. Mills, assistant professor of materials, college of civil engineering, Cornell University; cloth, 703 6 x 9-inch pages, 346 illustrations, published by John Wiley & Sons, Inc., and sold by *The Iron Trade Review* for $4.50, net.

This work covers the manufacture, properties and uses of the more common materials of engineering construction in a comparatively concise and thoroughly modern manner. It is intended to be simply a textbook and reference work of somewhat elementary character, not a treatise exhaustively covering the very broad field of "Materials of Construction". Tabulations of investigational data have been avoided wherever it has been found possible to substitute curves or diagrams; discussions of conflicting empirical data on points admitting of controversy have been reduced to a minimum; and an effort has been made to present the material in a definite, concrete form, the necessity for the exercise of discriminatory judgment upon the part of the inexperienced student being obviated by conclusions drawn by the author.

An effort has been made never to discuss the properties of a given material as abstract things, but only in relation to certain internal or external causes, dependent upon more or less variable factors in the process of manufacture, natural occurrence, or the conditions of service. With this end in view, the consideration of each material or class of materials is prefaced by a discussion of the ordinary applications of that material in engineering construction, followed by a study of its manufacture or natural occurrence (keeping always in view the dependence of properties upon manufacturing details, etc.), and concluded by a discussion of physical and mechanical properties in their relation to the uses of that material in construction.

The subject of testing materials has not been covered except insofar as mention of methods of testing are inseparable from discussion of the properties of materials as revealed by laboratory tests. It is the author's conviction that this subject can be handled properly only in the laboratory itself; that the place for such material is, therefore, in a laboratory manual. It is assumed, however, that a laboratory course in testing materials will invariably parallel and supplement the textbook course in the study of materials.

Shop and Factory Management, by Stewart Dean, superintendent of Dean Brothers Steam Pump Works, Indianapolis, 220 pages, cloth, published by the David Williams Co., and furnished by *The Iron Trade Review* for $2.00.

This volume is practically a working manual of methods applicable in metal shops and factories, based on the author's experience of 13 years as superintendent of a large plant. The style of the author is crisp and concise, his sentences are simple and no involved explanations are used. The economics of shop operations are presented in compact form to indicate on what lines the author has succeeded in increasing the output of all departments and reducing overhead expense. The volume is not based on theory but on the most practical experience, which has resulted in savings in every department.

The executive who studies this presentation of the subject carefully will find in the table of contents and index a bee line to the answer as Mr. Dean has found it, stated concisely, with reasons for the conclusion and an explanation of the best way to apply the new method. The literature of higher efficiency in machine shop practice is much enriched by this volume, which is practically a clinic where various troubles are taken up and discussed and the remedy applied to cure the condition.

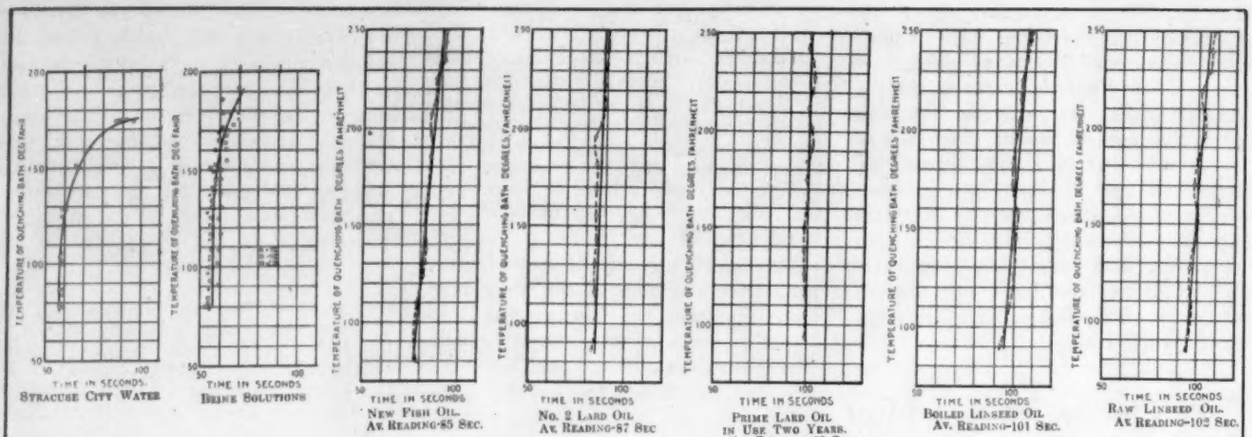
Simple methods are recommended and warning is given against applying too much system, which may swamp the activities of the executives at the cost of real efficiency in operation. The volume is filled with valuable suggestions.

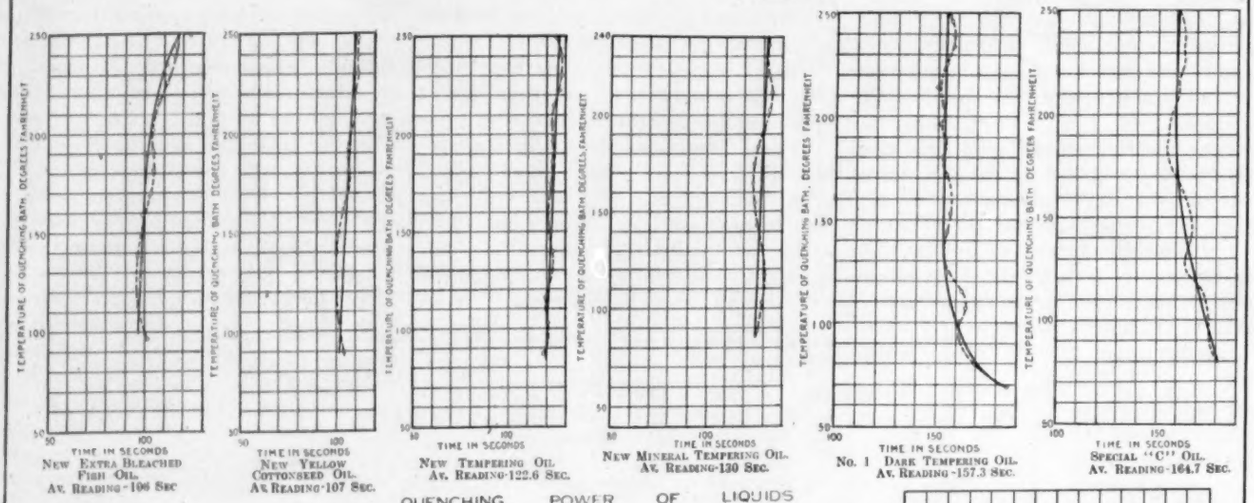
Table IV.

GASIFYING CAPACITY OF PRODUCER GAS MACHINE.

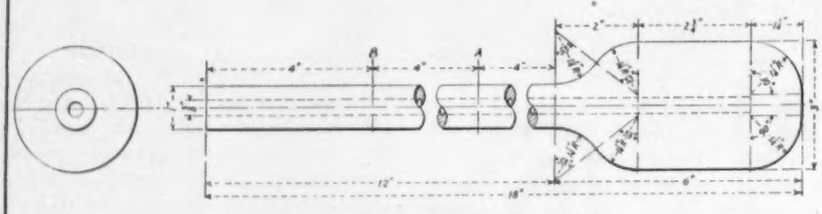
Date.	Net tons coal per day.	Oper. hours per day.	Lbs. coal per hour.	B. T. U. of Gas— U. S. Steel Standard.	B. T. U. of Gas— Total 32 deg. Fahr.
Sept. 21-22.	32.35	23.70	2,730	167.0	188.0
Sept. 22-23.	36.00	23.05	3,120	168.5	190.0
Sept. 23-24.	34.15	22.05	3,100	165.0	186.0
Sept. 24-25.	37.35	22.90	3,260	165.5	186.5

The Harris-Smith Coal & Coke Co., Uniontown, Pa., has removed its general office from Uniontown to the First National Bank building, Pittsburgh. The company's shipping offices will be retained at Uniontown. O. E. Lafleur, formerly affiliated with the Berwind-White Coal Mining Co., will have charge of the coal department.

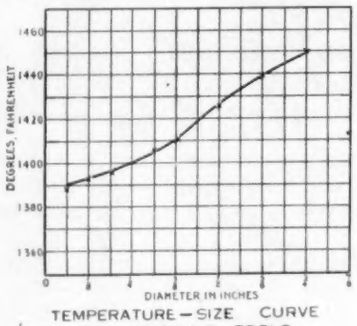

Syracuse City Water
Brine Solutions
New Fish Oil. Av. Reading-85 Sec.
No. 2 Lard Oil Av. Reading-87 Sec
Prime Lard Oil In Use Two Years. Av. Reading-99 Sec.
Boiled Linseed Oil Av. Reading-101 Sec.
Raw Linseed Oil. Av. Reading-102 Sec.


New Extra Bleached Fish Oil. Av. Reading-106 Sec
New Yellow Cottonseed Oil. Av. Reading-107 Sec.
New Tempering Oil. Av. Reading-122.6 Sec.
New Mineral Tempering Oil. Av. Reading-130 Sec.
No. 1 Dark Tempering Oil. Av. Reading-157.3 Sec.
Special "C" Oil. Av. Reading-164.7 Sec.

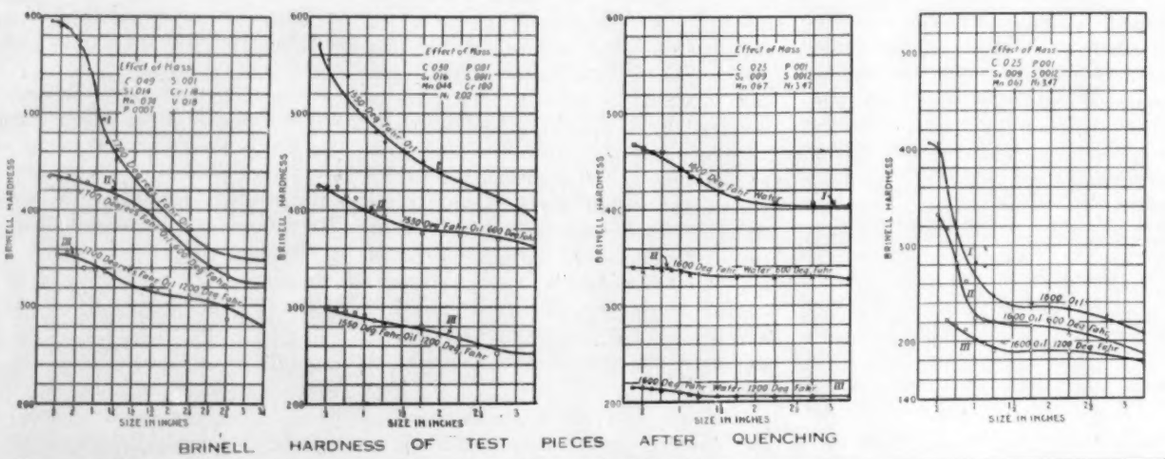
QUENCHING POWER OF LIQUIDS



TEST PIECE USED IN QUENCHING TESTS



TEMPERATURE—SIZE CURVE FOR HARDENING TOOLS



BRINELL HARDNESS OF TEST PIECES AFTER QUENCHING

RESULTS OF TESTS MADE IN HARDENING TOOL STEEL

Factors in Hardening Tool Steel

A Discussion of the Influence of Quenching Liquids, Mass and Shape, Time of Heating and Tempering in the Production of Tool Steel

BY JOHN A. MATHEWS AND HOWARD J. STAGG, Jr.

TOOL steels are included within the range of 0.60 to 1.50 per cent carbon, but not less than 90 per cent of them fall within carbon limits of 0.75 to 1.35 per cent. They are usually made by the very old crucible process or the very new electric processes.

Carbon forms at least one definite compound with iron, Fe_3C, known as cementite. This is the hardest constituent in steel. Cementite exists in annealed steel associated with a perfectly definite quantity of iron, or ferrite, as it is metallographically known. This definite relation between ferrite and cementite yields the constituent pearlite, in which the cementite and ferrite may exist in a laminated or a granular condition. This aggregate contains a definite percentage of carbon, 0.89 per cent, and steel containing 0.89 per cent carbon in its normal condition, is found to consist of nothing but pearlite when examined microscopically.

In steel containing less than 0.89 carbon the cementite associates with sufficient ferrite to form pearlite, and leaves the excess ferrite free in distinct microscopic grains or crystals. On the other hand, if the steel contains above 0.89 carbon, there is more cementite present than can become associated with ferrite, and the excess exists in separate particles, either granular or in a more or less perfect net work surrounding the pearlite.

The definite percentage of carbon which yields a full pearlitic structure in the annealed or natural condition is known as the eutectoid composition. Steels of lesser carbon are called hypo-eutectoid, and steels of higher carbon are called hyper-eutectoid steels.

When carbon steel is heated above a certain temperature, a change takes place in the constitution of the steel. This temperature is known as the carbon change point, critical temperature, or, preferably as the decalescence point. When this temperature is reached the pearlite becomes austenite, a solid solution of iron carbide in iron. This change occurs at a nearly constant temperature, but in case of hypo-eutectoid steels, the austenite first formed above the decalescence point acts as a solvent for the excess ferrite. In other words, at a somewhat higher temperature than the decalescence point, we obtain a homogeneous solid solution of all the cementite in all the ferrite. This is the best condition for hardening a low-carbon tool steel and accounts for the practice of heating low-carbon steels hotter than hyper-eutectoid steels for hardening.

The excess cementite of hyper-eutectoid steels is not readily soluble in the austenite first formed from the pearlite and it requires a high temperature to complete the solution of the excess cementite. Practically considered, nothing is gained by doing so.

Steels quenched quickly from above the decalescence temperature retain the carbon more or less perfectly in the condition of solid solution that existed above the decalescence point. The structural name for the quenched product is martensite. Hypo-eutectoid steels, hardened, may show either all martensite or martensite and ferrite. Hyper-eutectoid steel should show martensite and cementite.

The position of the critical temperature is fairly constant in all straight carbon tool steels, but is affected to a variable degree by the addition of alloys. Just as the addition of salt to water lowers the temperature at which the solution freezes, so the addition of alloys lowers the freezing point of steel and frequently lowers the position of the critical temperatures. The addition of 10 per cent of nickel to a one per cent carbon steel, or of 4 per cent of manganese, for example, lowers the critical point to such an amount that steels of these types are martensitic at ordinary temperature, even after slow cooling.

The determination of critical temperatures has materially assisted in the solution of many metallurgical problems. So far as we are concerned in this paper, however, it is sufficient that for the practical hardening of tool steels this critical temperature must be exceeded by a fairly good margin, at least 25 to 50 degrees Fahr., depending on the size, shape, mass and composition.

On heating steel through its critical range changes occur other than those noted. Steel is strongly magnetic below the critical range, but loses its magnetism within and above. The electrical resistance for hard steel increases with the temperature up to the critical point in a curve which is nearly a straight line. On passing through, the resistance increases abruptly, and after having passed through, the increase per degree rise in temperature is very much less than in either of the other two cases. The specific volume of a hardened steel is approximately 0.01 greater than in its annealed condition. These marked changes in physical characteristics occurring at definite temperatures, are indicative of the disturbances going on in the steel and occur at the temperature at which carbide carbon goes into solution on heating, or dissolved carbon is precipitated from solution on cooling.

Of great practical importance to the hardener, however, are the volume changes, both expansion and contraction, which occur during the critical ranges of temperature. The permanent changes in dimensions which steel undergoes in hardening are of the utmost interest to the hardener and associated with these changes is the problem of hardening cracks.

Le Chatelier has studied the phenomena of expansion or dilatation by accurate scientific methods and has divided the changes into three zones of temperature: (*a*) changes at temperatures below that at which allotropic transformation begins; (*b*) changes at temperatures above those at which allotropic transformation occurs, and (*c*) changes occurring within the critical range itself. During the first of these periods from 0 degree to 700 degrees Cent., iron and steel expand nearly equally, the amount of carbon exerting little influence. For any iron or steel, however, the amount or rate of dilatation increases with the temperature. Below 100 degrees Cent. the dilatation is about 0.000011 inch, while between 600 degrees and 700 degrees Cent. it increases to 0.0000165 inch per degree Cent. Above the critical range, however, the coefficient of dilatation varies directly with the carbon and is nearly twice as great for a 1.20 per cent carbon steel as for a 0.05 per cent carbon iron. The changes taking place at AC_1 and AR_1, Le Chatelier has not been able to study so satisfactorily. He has found, however, that the dilatation which increases directly with the temperature up to AC_1, suddenly stops and

Presented at a recent meeting of the American Society of Mechanical Engineers.

that instead of an expansion, a *marked contraction* has actually taken place. On cooling steel from high temperatures, these changes in dimensions are reversed, although they are not quantitatively equal, nor do they occur at the same temperatures. It is an axiom that heat expands and that cold contracts; but with steel there is a certain critical temperature at which an abnormal behavior is noticed, namely, a sudden shrinkage on heating and an expansion on cooling. The expansion of steel in heating to 750 degrees Cent. is about ⅛-inch per foot, and when we recall that, in quenching, a corresponding contraction attempts to take place suddenly, it is little wonder that strains are set up that may exceed the ultimate strength of the steel.

What is the relation of the above to over-heating, *i. e.*, heating above that temperature at which it is necessary to harden? After passing through the critical range, the expansion takes place at its maximum rate. When steel is heated in such a manner it assumes the shape corresponding to the maximum temperature and on cooling the whole piece tends to return to, or near, its original size. In so doing, the outer, or first cooled, portion is hardened first and forms a hard, brittle, unyielding shell, and the strains set up by the slower cooling interior may either (*a*) fracture the shell, producing external cracks, especially if the shell be uneven in thickness, or (*b*) burst the piece at the center if the shell is of even thickness and strength. This latter occurrence is accompanied by a peculiar appearance of the fracture and frequently and wrongly called pipe.

Time of Heating

Too much stress cannot be laid on the fact that there is a correct length of time for heating and that this time of heating is as important as the temperature to which heated. There are at least two dangers which must be avoided.

First, if the heating be too fast, a uniform temperature does not exist throughout the mass being heated. For example, a die block heated too quickly may exhibit the following conditions: The outer portions may be above AC_1, and expanding at the maximum rate; the intermediate portions may be in the transformation range and contracting; while the inner portion, which is below AC_1, is slowly expanding at the characteristic rate below AC_1. It is no wonder that steel fractures under such conditions.

Second, grain size depends among other variables under (*a*) temperature above AC_1, and (*b*) time above AC_1. If heating be of such a character that the piece is held above AC_1, for an abnormally long time, the crystals may have grown to such an extent that on quenching, abnormal grain size is retained and the result is a weak, if not cracked, piece.

Quick heating in a furnace which is considerably hotter than the correct hardening temperature is extremely bad practice. The difficulty is that the thin parts, corners, and edges are liable to attain an overheated temperature before the larger portions of the piece attain the correct hardening temperature, and this overheating of the thin parts produces large grain size, abnormal expansion and tends to produce cracks.

Speed of Quenching

If a sample of steel be cooled slowly from above AC_1, the solid solution which has been formed breaks up and precipitates its cementite and ferrite and we have then an annealed steel. If the cooling on the contrary be rapid, the solid solution is not given the time necessary to permit the complete dissociation into cementite and pearlite and we find formed the intermediate break down of austenite, known as martensite. If the cooling be intermediate in its speed between extremely slow and extremely fast, we find intermediate microconstituents, troostite or sorbite. The correct constituent, however, in a hardened steel is martensite, and to form this martensite the material must be cooled quickly.

There are several degrees of "quickness" which at once suggest themselves. There is, however, a critical rate of cooling through the range which must be attained before the piece will be hardened.

On quenching it is clear that the surfaces of the section are cooled and hardened first. If the mass being cooled is of considerable size, different degrees of hardness are noticed from the outside to the middle. Tests made of small treated bars showed that the corners, or thinnest portions were the hardest. Next in hardness were the edges and the decrease in hardness was quite uniform to the center.

The cooling medium used, its temperature, and condition also affect the rate of cooling. Benedicks has investigated this subject and arrived at conclusions of extreme interest. He found that in order that a liquid present in large bulk may exhibit a good quenching power it is necessary: (*a*) That it should possess a high latent heat of vaporization; (*b*) that it be maintained at a temperature low enough to avoid too abundant formation of vapor. High specific heat, low viscosity and large heat conductivity all act, it is true, in the direction of quick cooling, but the influence of the two factors last mentioned appears to be of a different and lesser grade, however, than the heat at which vapor is formed. The authors have devoted considerable time to investigating numerous commercial mediums which are in use in typical hardening plants of the country at the present time. The results given are only a small portion of those actually obtained, but they are typical.

In attacking the problem, the following method was adopted: A test piece of the dimensions shown in the accompanying illustration was machined from a solid bar, and a hole drilled through the neck to within an equal distance from each side and bottom of the test piece. Into this hole a calibrated, platinum-rhodium couple was inserted and the leads connected to a calibrated galvanometer. The test piece was then immersed in a lead pot, also containing a thermo-couple to the point *A*, and the lead pot was maintained at a temperature of 1,200 degrees Fahr. When both the couple inside the test piece and the couple in the lead pot read 1,200 degrees Fahr., the test piece was removed and quenched to the point *B* in 25 gallons of the quenching medium under consideration.

At the start the quenching medium was maintained at room temperature. The time in seconds that it took the test piece to fall from a temperature of 1,200 degrees Fahr., to a temperature of 700 degrees Fahr., was noted by the aid of a stop-watch. It is clear that immersing the test piece in the quenching medium raised the temperature of the medium. The test piece was then replaced in the lead, heated to 1,200 degrees Fahr., quenched into the medium at this higher temperature and the time again taken with the stop-watch. These operations were continued until the quenching media, in the case of oil, had attained a temperature of about 250 degrees Fahr. The results obtained, time in seconds, for a fall from 1,200 degrees Fahr. to 700 degrees Fahr., were plotted against the temperature of the quenching medium and a series of curves, as shown in the accompanying illustration, was obtained.

Comparison of Quenching Rates

A consideration of the results is interesting. Pure water has a fairly constant quenching rate up to a temperature of 100 degrees Fahr., where it begins to fall off. At 125 degrees Fahr., the slope is very marked. Brine solutions have both a quicker rate of cooling and are more effective at higher temperatures than water. The curve does not begin to fall off seriously until a temperature in the neighborhood of 150 degrees Fahr. is reached. Where water at 70 degrees Fahr. cooled the test piece in 60 seconds, the brine solutions cooled it in 55 seconds. The oils are slower in their quenching powers than water or brine solutions, but the

majority of them have a much more constant rate of cooling at higher temperatures.

Hardness and Mass

It has been known for some time that different masses of the same material on being quenched under like conditions gave varying physical properties, but it is only within recent years that the quantitative effect has been measured. Below are given the results of tests to determine this effect.

Test pieces 4 inches long were made from the same ingot in sizes increasing ⅛-inch in both breadth and thickness. The smallest was ⅜ inch square and the largest 3¼ inches square. Three ingots of different type analyses were chosen and a series of test pieces made from each. The test pieces were heated in a semi-muffle furnace to a constant temperature for each type of material, quenched, and the Brinell hardness test made. Each series was then drawn to 600 degrees Fahr. in a salt bath and Brinell tests again taken and then reheated to 1,200 degrees Fahr. in a salt bath and Brinell hardness tests again run. Brinell hardness plotted against test piece size is shown in the accompanying illustration.

The results show that the smaller the sample the greater the figure of hardness, indicating that the smaller sections are cooled with greater rapidity than the larger, and hence more hardness is developed. The same agencies are at work in tool steel. The larger the mass the smaller the depth of hardness when quenched under similar conditions.

Benedicks has shown that for steel of constant mass, the higher the temperature, the greater the rate of cooling. Two of his results are as follows:

Weight of Specimen in Grams.	Deg. Cent. Quenching Temperature.	Cooling Time, Seconds.
12.3	845	4.43
12.3	703	5.73

It is evident that in order to produce the same amount of hardness in a small and large section it is necessary to heat the larger section hotter than the smaller. A commercial application of this phenomenon will perhaps be interesting. The authors recently were confronted with the problem of finding out the correct temperature for hardening tools made from the same steel in sizes varying from 1/16-inch diameter to ¾-inch diameter. The temperature-size curve shown in the accompanying illustration finally was adopted. In other words, a 3/16-inch round will harden at 1,395 degrees Fahr., while a ¾-inch round bar should be heated to 1,450 degrees Fahr.—a difference of 55 degrees.

After the hardening operation has been safely performed, the next im-

(*Continued on page 198b*)

Canton Furnace

Being Planned by Kennedy—Construction Will Soon be Started

Julian Kennedy, Pittsburgh, is preparing plans for the 400-ton blast furnace to be built at Canton, O., by financial interests identified with the United Steel Co., that city, and Pickands, Mather & Co., Cleveland, and it is expected that within two or three weeks preliminary plans will be finished for the furnace and also for the Koppers by-product coke plant. The corporation to be known as the United Furnace Co. will be organized to operate the plant. The United Steel Co. will take 75 per cent of the pig iron output and the remainder will be sold. It is confidently expected that freight rates on coal in the western Pennsylvania district will be adjusted so that Canton will not be at a disadvantage of 25 cents a ton as compared with Youngstown, as it is at present.

The United Steel Co. was incorporated in February, 1904, and has an authorized capital stock of $1,500,000. The development of the present plans for a blast furnace and coke plant is the consummation of a project which has been pending for a year. Officers of the United Steel Co. are: President, F. H. Snyder; vice president, E. A. Langenbach; treasurer and general manager, Harry R. Jones; secretary, E. L. Hang. The main office is at Canton, O.

Death of Dr. J. A. Holmes

Dr. Joseph A. Holmes, director of the bureau of mines, department of the interior, died last week at his home in Denver, Col., whence he had gone some time ago with his family in the hope of recovering his health. Tuberculosis was the cause of death. Dr. Holmes was born in South Carolina in 1860, was educated at Cornell University and later became professor of geology and natural history at the University of North Carolina. In 1904, President Roosevelt placed him in charge of the laboratories maintained at St. Louis and Pittsburgh by the United States geological survey for the testing of fuels and structural materials. He rendered highly valuable service and, when the new bureau of mines was created in 1910, he was made director of it by President Taft. Under his able direction, much progress was made in effecting means for saving life in mine accidents, and in other ways the efficiency and usefulness of the bureau were promoted.

Dr. Holmes was a member of the American Institute of Mining Engineers, the American Society for Testing Materials, the American Society of Mechanical Engineers, and other engineering and geological societies.

Steel Exports

Are Steadily Growing—Iron Ore Imports Increase

Statistics collected by the bureau of foreign and domestic commerce for May show that the exports of iron and steel products reported on a tonnage basis amounted to 246,530 tons, compared with 134,605 tons in May, 1914, and 223,236 tons in April, 1915. The exports last March were only 174,311 tons. These figures indicate a steady increase in exports, but the tonnage for the 11 months ending May, 1915, was less than for the same period ending in May, 1914, the totals being 1,632,923 tons for the 11 months ending May, 1915, and 1,939,320 tons for the 11 months ending May, 1914.

IRON ORE IMPORTS.

	May,		Eleven months ending May,	
	1915.	1914.	1915.	1914.
Spain	9,705	.....	62,086	61,468
Sweden	6,745	42,214	174,141	308,158
Canada	3,504	1,064	40,339	141,399
Newfoundland and Lab.	.....	.....	17,500	157,325
Cuba	58,220	69,250	678,401	1,213,763
Other countries	20,800	13,131	102,072	96,902
Total	98,974	125,659	1,074,539	1,979,015

IRON AND STEEL EXPORTS.
GROSS TONS.

	May,		Eleven months ending May,	
	1915.	1914.	1915.	1914.
Scrap	1,050	3,411	22,550	66,684
Pig iron	18,581	11,726	108,483	189,101
Billets, ingots, and blooms of steel	48,391	6,872	171,417	41,800
Wire rods	11,236	6,767	80,302	44,116
Steel rails	16,646	15,659	122,040	325,452
Steel bars	37,260	10,151	176,371	137,977
Iron bars	2,394	359	10,071	9,966
Struc. iron and steel	14,072	14,772	145,612	280,449
Hoop, band and scroll	1,578	968	13,088	10,763
Sh'ts & plates	34,259	24,214	242,749	346,336
Tin and terne plates	7,217	4,695	72,426	40,093
Barbed wire	18,182	5,336	123,463	73,049
All oth. wire	19,165	7,062	119,044	77,418
Cut nails	376	661	2,227	4,174
Wire nails	6,459	2,330	45,291	33,555
All oth. nails includ. tacks	726	311	4,189	2,958
Pipes & fit'gs	6,393	16,355	144,175	222,756
R. R. spikes	264	1,075	4,883	7,872
Bolts, nuts, rivets, wash	1,272	1,401	12,019	18,491
Horseshoes	865	122	10,060	1,177
Cast radiators	144	358	2,463	5,133
Total	246,530	134,605	1,632,923	1,939,320

Iron ore imports in May amounted to 98,974 tons, compared with 125,659 tons in May, 1914, and 91,561 tons in April, 1915.

The Carnegie Steel Co. has started its new benzol plant at Sharon, Pa., and within the next 30 days benzol and other by-products will be placed on the market.

News of Employers and Employes

Row Among Labor Unions Results in Sensational Statement From President Gompers, Who Connects Trouble With the War

A tie-up of numerous New England plants manufacturing munitions or machinery for the production of war supplies is the threatened outcome of labor dissensions which have broken out in connection with the construction of extensions of the Remington Arms Co., Bridgeport, Conn., and now involve the danger of spreading to other works.

The situation is a peculiar one, as the trouble originated in a dispute among the labor unions represented among the men at work upon the new buildings. The millwrights who have been engaged in fitting-out the extensions recently joined the carpenters' union at the suggestion of the general contractor, they allege. Thereupon the structural iron workers' union notified the general contractor, the James Stewart Co., that the millwrights were doing iron work and must join either the iron workers' or the machinists' unions. The millwrights were willing to make the shift, as the iron workers' scale is $5 a day, while that of the carpenters is $3.75, but the latter objected. The result was the 300 structural workers struck, and were joined by the millwrights.

Now the machinists have taken an active hand and at a mass meeting decided to strike unless the Stewart company takes back the strikers. The demands also have included the Remington company and if they are refused, the machinists have determined upon demands to be required of the manufacturing company, which include double time for overtime, an eight-hour day, recognition of the union and minimum wage. The executive committee of the men also has been empowered, if necessary, to call a strike against a score of companies which are working on sub-contracts for the Remington company. These include a number of machinery building plants in Bridgeport. Plants in other cities may be affected.

The whole situation as analyzed by observers is an attempt of union leaders to take advantage of the conditions that have arisen for an attempt to unionize Bridgeport plants which heretofore have been open shops.

A remarkable statement in regard to labor conditions in the east has been made by President Gompers, of the American Federation of Labor, who declares that an attempt to tie up shipping of this country through a longshoremen's strike at every important port has been made by the same influence which brought about the labor trouble of the Remington Arms Co. with the view to checking the export of arms and munitions of war.

Blow at Allies?

Failing in their efforts to get the longshoremen to strike, despite the enormous slush fund at their disposal, Gompers declared, these influences then attempted to bring about a seamen's strike, which would tie up the steamship lines carrying the munitions to Europe. In many other directions, also, he said, efforts had been made by the same influence to tie up some branch of American industry which would hamper the manufacture or transportation of the munitions themselves, or of the materials which they were made.

"Not only at Bridgeport have the efforts of this influence made themselves felt," said Gompers, "but in many other places, where the activities of this propaganda for preventing the exploitation of arms have been exercised to the injury of labor, or, at least, where the success of the propanganda would have resulted in injuring labor, the details have been brought to my attention. I do not wish at this time to disclose the sources of my information, or to pin down too closely my charges to any particular person or nationality, but I am as sure of it as I can be, as my sources of information are most creditable.

"There is no doubt whatever that there is a systematic propanganda working to bring about labor troubles to check the manufacture and transportation of munitions in the United States. There is no doubt that this propaganda has almost unlimited means at its disposal. Now no good can come to anyone from these interests having this enormous slush fund."

Payment to Loewe

The Savings Bank, of Danbury, Conn., has paid to D. E. Loewe & Co., of that city, the sum of $19,423, representing the deposits of members of the hatters' union, which were attached when the Danbury Hatters' suit was begun by the former company 10 years ago, to combat a boycott. The Loewe company recently won a complete victory in the United States supreme court. Suit to decide the ownership of the interest upon these deposits still is in the courts. Members of hatters' locals throughout the country are contributing 1 per cent weekly of their earnings towards a fund to redeem the homes of the defendants.

Profit Sharing

The Spencer Wire Co., operating plants in Worcester and Spencer, Mass., and employing nearly 800 hands, announces a profit-sharing plan from July 1, 1915, to July 1, 1916, whereby every employe will receive a dividend at the same rate as the stockholders, which is expected to be not less than 6 per cent. The plan is to be tried as an experiment for one year and if it works out satisfactorily, is expected to be continued thereafter. President Harry W. Goddard, in making the announcement for the directors, says that the company hopes that the profits will be increased by the employes taking a personal interest in the continued success of the business, leading them to exercise the greatest possible care to prevent bad work and waste of time and material; also to encourage increased production and suggestions for improvements of any nature.

The notice further says: "We want all to stay with us steadily, rather than change occasionally or frequently, for you can do as well here as anywhere. You can help by encouraging your fellow workman to stick to his position and assist in securing desirable fellow workmen. You can assist by seeing that others do not carelessly waste or destroy our property, and look out for small savings which, in themselves, do not amount to much, but in the aggregate are very important. Any on the profit sharers' list who may be discharged, or who may leave our employ or who shall be deemed unsatisfactory, during the 12 months period, will forfeit all claim to chance in the division of profits that year. The amount thus forfeited will be saved to the company, however, but will be carried to a benefit fund, out of which the directors of the company may grant assistance to aged or disabled employes".

What Decision Means to Business

Opinions of the Court in the Government's Dissolution Suit Against the United States Steel Corporation

BELIEVING that the decision in the government's dissolution suit against the United States Steel Corporation, by the United States district court for the district of New Jersey, was of very great importance not only to the iron business, but to the industries of the country in general, *The Iron Trade Review,* by publishing the opinions of the court in full and opinions of leading men in the business world as to the effect of the decision, and by editorial comment, has endeavored to serve its readers in an adequate manner. In order, however, to throw all possible light on the decision, we have had the following article prepared by a lawyer who is thoroughly familiar with all the facts and evidence of the case. It is the result of much thought and study. We commend it for careful perusal.

THE DECISION of the United States district court for the district of New Jersey, refusing to grant the government's petition that the Steel Corporation be dissolved, means much to business men. First and foremost, it means that big business, if properly conducted, does not violate the federal anti-trust law. This was, of course, foreshadowed in the opinions of the supreme court in the Standard Oil and Tobacco cases, but those cases resulted in dissolutions, and for that reason the principles there laid down did not carry the same degree of assurance to the business world that would otherwise have resulted. People in general and business men in particular wondered whether a company of large capital and resources, producing a substantial percentage of one of the country's staple commodities, composed of a combination of previously independent concerns, which resulted, perhaps, in the elimination of some competition, would be held legal under the anti-trust act, even though the purpose of its organization was commendable and the conduct of its business fair. It remained for the decision in the Steel suit to answer this question in the affirmative.

A Question of Business Facts

As Judge Buffington said in his opinion, the chief question to be determined in the Steel case was one of business facts. The principles to be applied had been clearly laid down in the Standard Oil and Tobacco cases, and the duty of the court was to apply those principles, after having first examined the proofs and found the ultimate facts. The proofs relating to the organization of the Steel Corporation, its subsequent acquisitions, the extent of its control of the iron and steel business, its competitors, its business practices, its foreign trade and other subjects, too numerous to mention, are treated with a breadth of view and keenness of insight which have been seldom rivaled in judicial opinions. And from these proofs are drawn conclusions of fact and law which cannot but commend themselves to all business men for their hard-headed common sense. In this aspect, the case is distinctly encouraging because it indicates a disposition on the part of the court to treat the facts from the standpoint of the business man, not narrowly or technically, nor with distorted vision. Indeed, in determining whether monopoly or trade restraint exists, the court adopts the judgment of the business competitor and customer in preference to the opinion of the uninformed critic who too often unwarrantedly condemns business conditions.

Of no little interest is that part of Judge Buffington's opinion dealing with the foreign trade of the Steel Corporation. It is highly important to the business man because it is a concrete example of how a large percentage of a considerable branch of trade may be legitimately acquired. The opinion points out that at the time the Steel Corporation was formed, foreign trade in steel products was spasmodic and undeveloped, and that through the continuous and indefatigable efforts of the Corporation, it has built up a foreign trade of large proportions, amounting to from 80 to 90 per cent of the foreign iron and steel business of the United States. The court said that to hold this foreign trade, the mode of building it up and its retention when built up contrary to the Sherman law would be practically and commercially to enjoin the steel trade of the United States from using the business methods which are necessary in order to build up and maintain a dependable business abroad, and if the Sherman law were so construed, it would itself be a restraint of trade and unduly prejudice the public by restraining foreign trade.

The Gary Dinners

One of the most important subjects dealt with in the opinions of the court, so far as the business man is concerned, is that of the Gary dinners. The question of the extent to which competitors may assemble and co-operate is one in which every business man is interested. The Gary dinner movement, as is well known, was one of co-operation between competitors. It had its inception during the panic, which commenced in November, 1907, and its primary object was to prevent demoralization in the steel trade of the country. The entire court was in accord on the proposition that the co-operation brought about by the Gary dinners would have been proper had it ceased with the passing of the panic. In other words, it was decided that competitors may co-operate even to the extent of preventing the cutting of prices, if such co-operation is in order to minimize the harmful effects of a disastrous panic. The court found, however, that the Gary dinner movement continued after the force of the panic had been spent, and that, through its influence, prices were artificially maintained, if not by agreement, by the moral obligation imposed upon those who participated in the dinners and committee meetings. These practices, although the participants in the movement were absolved from any wrongful intent, were unanimously condemned, and had they continued down to the filing of the government's bill, an injunction would have been granted restraining their continuance.

In discussing the Gary dinners, the court took

occasion to outline to what extent co-operation between competitors is proper. It was pointed out that in these days every large business has its societies and associations which meet periodically to exchange information of all kinds, to compare experiences, to take note of improvements in machinery or process, to discuss problems, and generally to profit by the interchange of ideas and the study of observed facts. Meetings for such purposes are not illegal and if, as is natural in the case of manufacturing companies, the discussion of the subjects enumerated lead to the specific consideration of prices, there is no violation of the anti-trust act, even though each individual present, acting for himself, should announce the price he intends to charge for his wares. But if the individuals present act under the understanding, even though there be no legal agreement, as that term is commonly understood, that the price announced will be adhered to until notice has been given of an intention to make a change, such co-operation violates the anti-trust act. The question is whether the action taken is really that of each individual acting for himself, or whether those present are, in fact, pursuing a common object which is to maintain prices and which has that effect. Under the decision, it would appear very difficult to convince a court or jury that when competitors meet by arrangement and discuss particular prices of particular commodities, each in turn announcing his intention as to price, such action is purely individual and not collective.

Individual Rights

As showing that an individual may attempt to do alone what would be unlawful if brought about by co-operation, the court's decision in regard to the Steel Corporation's price policy is instructive. The announced policy of the Steel Corporation has been in favor of a reasonable stability in prices. It has attempted by its example in refusing unduly to raise or lower prices to prevent sudden and violent fluctuations upward or downward, with the result that in boom times its prices have been somewhat lower than its competitors', and in slack times, somewhat higher. This policy and the practice of the Steel Corporation in pursuance of it were held by the court to be legal. Indeed, the court pointed out that the public was as much prejudiced by prices unreasonably lowered for the purpose of stifling competition by driving competitors out of business as by unreasonably high prices, and the conclusion was reached that a fair price is somewhere between the two extremes, varying, of course, with the conditions which naturally affect the price commodities.

It is impossible to detail all that the decision in the Steel case means to business men. While the opinions of the court deal with facts relating to a particular industry, the application of the law to these facts involves the discussion of general business principles, and it is only by a thoughtful reading of the opinions published in full in *The Iron Trade Review* of June 10, that a thorough appreciation of the meaning of the decision can be obtained. Such a reading will well repay the reader, no matter in what branch of business he may be engaged.

INTERESTING FACTS ABOUT THE MESABI

Second of a Series of Short Talks on Iron Mining

BY P. B. McDONALD

Some of the interesting facts which impress a visiting mining man on the Mesabi aside from the magnitude of operations are:

The scarcity of air-compressors and rock drills at the mines, since little power drilling is done on account of the soft, sandy ore. Hand augers are the customary means of drilling holes for blasting, although it may be remarked that a new combination power drill and auger has been developed for drilling the streaked formations common there, and is said to be a convenient and light machine.

The policy of stockpiling large tonnages of ore on surface at underground mines during the winter for shipping by steam-shovels in the summer.

The large amount of water pumped, since even a comparatively small mine, perhaps 200 feet deep, is apt to have a large triple-expansion steam pump and a 12 or 14-inch discharge line, the excessive water being due to the flat, swampy Minnesota topography and to the large area of the flat-lying ore bodies.

The variety of colors of the ore in some pits where equally rich ore may be yellow, red, pink, purple, blue or black. Visitors sometimes fill a boiler gage glass with different colored ore to be taken away as a curiosity.

The prevalence of Cornish or "Cousin Jack" mining captains (or foremen) of the stocky, red-faced, big-fisted kind, and the evident influence they have had on the lay-out of things such as large, bulky machinery, huge timber headframes, and admirable stoping methods evolved from Cornish ingenuity. (At the beginning of the strike of 1907, I saw a huge, beefy, Cousin Jack, mining captain knock a "Finlander" miner through a screen door for making an unmentionable reference to the captain and his bald head.)

The fact that many of the underground miners, particularly those working on contract, do their own shoveling (a different practice from Michigan hard-ore mines), and that large number of Balkan natives and Finns are found working both on surface and underground.

The difficulties of sinking in, and mining near, quicksand and heavy water overburdens.

The great number of steel-car ore trains gravitating and being pulled down to the head of Lake Superior during the shipping season, where magnificent steel, wood or concrete ore-docks load and mix the ores into up-to-date lake steamers for transporting to lower lake ports at surprisingly small tariffs.

Analysis of Alloy Steels

A pamphlet prepared under the direction of the chemists' committee of the United States Steel Corporation on the sampling and analysis of alloy steels, now is being distributed to the various chemical laboratories of the Corporation's subsidiary companies. This is the fifth pamphlet so distributed and the purpose of each of these is to unify and simplify methods of analysis. The first four pamphlets covered the sampling and analysis of iron ores, pig iron, gases and plain steels. However, there is an exceedingly large demand for these pamphlets from persons and firms outside of the United States Steel Corporation and to conserve the supply, it has been decided to charge $1 for each of these to persons and firms not affiliated with the Corporation.

Increased Activity on the Cuyuna

But Mines Are Not Operating at Full Capacity— Interesting Details as to Developments

AT NO TIME during the year 1915 have the activities in the Cuyuna district, Minnesota, been so marked as they are in this month of July, but capacity operations at any of the mines have by no means been reached.

At the Kennedy mine, in Sections 29 and 30, 47-28, operated by the Rogers-Brown Ore Co., the daily hoist of about 650 tons is loaded into cars and shipped. The stock pile of 107,000 tons remains untouched. The ore now mined runs higher in iron and lower in moisture than heretofore.

At the Croft mine, in Section 1, 46-29, operated by John A. Savage & Co., the cylindrical, concrete shaft was ledged at 105 feet. Its successful completion is most gratifying to all concerned, for it enables the early operation of the only bessemer ore deposit in the entire Cuyuna district. Sinking will be continued to 200 feet.

At the Thompson mine, in Section 11, 46-29, operated by the Inland Steel Co., the shipments from the pit go forward rather irreguarly due to the natural occurrence of mixed ores. A small washing plant has just been installed and is being operated for the time being in an experimental manner. Much of the upper part of the deposit requires washing, being contaminated with fine-grained decomposed chert.

The Inland Steel Co. also operates the Armour No. 1 and No. 2 mines. The latter is an underground operation in Section 11, 46-29. Its stock pile of over 100,000 tons has been shipped and the daily hoist now goes forward regularly. This deposit is large in tonnage, high in iron, and is probably the best all-around deposit of non-bessemer ore in the district. The Armour No. 1 is in Section 10 and adjoins the No. 2 on the west, but the deposit of the former is not exactly a continuation of that of the latter, and the ores appear differently, although both average high in iron. Small portions of both deposits are manganiferous. The Armour No. 1 was opened as an underground mine, but has not shipped ore since July, 1913. This spring stripping operations were started to uncover the westerly part of the deposit and it is expected that ore will be shoveled some time in August. The Pennington mine, in Section 10, 46-29, adjoining the Armour No 1 on the west, is active only this year insofar as the pit is used in part for the stripping operations on the Armour No. 1 property, the latter work also being done under contract by the Pennington Mining Co., a subsidiary of the Tod-Stambaugh Co. It is generally understood that the Pennington will not ship this year.

The Ironton and the Cuyuna-Mille Lacs mines, operated by the American Manganese Mfg. Co., of Dunbar, Pa., are both idle. The former is on the same deposit of ore as the Armour No. 1 and its ores are of the same good quality, but the Cuyuna-Mille Lacs, north of the Pennington, is mainly on manganiferous material, parts of which have some value because they are low in phosphorus and silica.

Adjoining the Cuyuna-Mille Lacs property on the east in Section 3, 46-29, is a prospect on material similar to that of the former. A small head frame has been erected on an exploration shaft and a small amount of exploratory underground work is planned by the lessee, the Cuyuna-Sultana Co.

Between the Cuyuna-Sultana property in Section 3 on the north and the Pennington in Section 10 on the south is a recent find of importance, also in Section 10, 46-29, the deposit now being stripped by the Mahnomen Mining Co. This company has no furnace affiliations. The operation is in charge of C. K. Quinn, formerly a mining engineer with the Jones-Laughlin subsidiary company operating on the Mesabi. The stripping will amount to about 800,000 yards. The ore deposit is deep, is of large tonnage and a substantial part is high in iron. There is also a large tonnage of manganiferous material available. The operator intends to ship some ore in the fall.

A mile westward, in Section 9, 46-29, the Hill Mines Co. is opening the Hillcrest mine. This is to be a pit operation and the surface material is being removed by hydraulic methods. It is not likely that ore will be shipped this fall. This deposit has many features to commend it.

Two miles westward, in Section 18, 46-29, is the Rowe mine of the Pittsburgh Steel Ore Co. This is a pit operation, the largest in the district. The overburden was moderately shallow and largely removed by hydraulic methods. Last year a small tonnage of ore was shipped as mined, but none this year. The property contains a vast tonnage of material which must be concentrated to some degree before it can be used advantageously and for that reason the operators are now installing a small, but a commendable concentrating plant capable of giving a complete treatment, like at Coleraine, on the Mesabi. It is expected that the plant will be ready for operations some time in August.

The Iron Mountain mine in Section 33, 47-29, in an outlying district, is actively engaged in opening a deposit of manganiferous material. The property is being operated by the Iron Mountain Mining Co., one without furnace affiliations.

The Duluth-Brainerd Mining Co. mine in Section 32, adjoining the Iron Mountain mine, is on manganiferous material. The property is idle.

The Meacham mine in Sections 11 and 12, 46-29, lying between and adjoining both the Croft and Thompson properties, is not being operated. The lease is being carried by the Rogers-Brown Ore Co.

The foregoing properties are all the operations on the north range, which is today the principal part of the Cuyuna district. There are other operations on the south range of the district, which will be described in a similar manner in these columns at an early date.

Building Cars for Russia

The American Car & Foundry Co. has announced that 2,100 of the 5,000 box cars it is to build for the Russian government will be made at its plant in Madison, Ill., and that work on the cars would be started about Sept. 1. Workmen have started to put the necessary machinery in order, and the only delay will be that required to get the material on hand and the necessary number of skilled laborers. The plant has a capacity for turning out 50 cars a day, and employs 3,000 men when working full time.

The H. K. Porter Co., Pittsburgh, is working on 22 locomotives weighing 72 tons each, and 11 locomotives weighing 67 tons each, for Russia. The company also has an order for 33 locomotives of a lighter type, for railroad interests in Havana, Cuba.

Export Demand is of Record Size

Much Business Entered for Shipment to Europe and a Larger Amount Pending —Pittsburgh Market Slumps for First Time in 12 Months

EXPORT DEMAND for machine tools again is of record proportions. During the past week a large volume of business was entered for shipment to the belligerent countries in Europe and an even larger amount is pending. Most of the foreign inquiries pending are of an urgent character, but, due to the extent to which the machine tools in greatest demand are sold ahead, it seems doubtful whether a number of these at least will be closed now. For instance, one urgent foreign inquiry involves 700 36-inch lathes; and to secure so large a number of these big lathes at this time is a problem which seems impossible of solution. Another foreign buyer wants 200 lathes of the same size. In addition to lathes and screw machines of all kinds, the foreign demand involves milling machines, cutting-off machines, hydraulic and other presses, radial and plain drills, etc. In addition, a large amount of business, in the aggregate, continues to be entered from domestic concerns which previously have been large buyers of machine tools to manufacture war munitions. Large purchases were made during the week by the New York Air Brake Co. and the General Vehicle Co., Long Island City. Inquiries from railroads are becoming more general. In addition to inquiries from the Seaboard Air Line and the Pennsylvania and Southern Pacific railroads, reported in last week's issue of *The Iron Trade Review*, scattered inquiries have come out from the Wheeling & Lake Erie, the New York Central, the New York, Ontario & Western, and other roads. The Southern Pacific has put out some additional inquiries since last week. Among current inquiries is one from the Bethlehem Steel Co. for 12 to 15 lathes and a number of slotters; this company also is in the market for three small jib cranes. The General Electric Co. is in the market for 10 to 15 lathes and some other equipment. The American Smelting & Refining Co. is in the market for a steam hammer and several machine tools.

Quiet Market at Pittsburgh

FOR THE FIRST time in approximately 12 months, machine tool dealers at Pittsburgh say the market shows no snap. Quiet conditions of the last few days, however, are not expected to continue for more than a week or 10 days, since numerous inquiries for equipment for the manufacture of war material and for the domestic trade are pending and it is generally believed that a number of attractive orders will be booked before the close of July. The Westinghouse interests, the heaviest buyers of lathes in the Pittsburgh territory this year, continue to negotiate for additional equipment, and several other concerns in western Pennsylvania manufacturing ammunition are quietly figuring requirements. The United States Steel Corporation has broken ground for its new $3,000,000 spelter plant at Donora, Pa., and is expected to buy necessary equipment at an early date. It is reported unofficially that some contracts already have been placed by the Steel Corporation. The Shelby Steel Tube Co. has completed plans for doubling the capacity of its Standard works at Newcastle, Pa., where a main mill building, 240 x 600 feet, a power house, foundry and other shops will be erected as soon as possible. Contemplated plans of the Shelby company had been referred to previously, but officers of the concern refused to offer any definite information until this week. The Saturn Machine Co., Wheeling, W. Va., will install and equip a complete brass foundry.

Equipment Adapted for Other Uses

ONE OF THE significant tendencies of the machine tool business at present is the adapting of equipment to other uses than those for which it was designed. This is a result of shortage in some lines due to demand for machinery best suited to munition making. When lathes are not available and screw machines cannot be obtained, much ingenuity is exercised in making other forms of tools perform the work usually done by lathes. A case in point is an inquiry by a Chicago concern for 28 extra heavy duty axle lathes, a line of tools not yet exhausted, which will be adapted to turning heavier sizes of shrapnel cases. Special devices will be provided and two operations will be carried on at the same time. Inquiry for machine tools continues strong in the Chicago market, although by far the greater portion is offered directly for export to Canada or Europe or for use in this territory for making munitions. It is understood a number of contracts have been placed with machine shops there for making munitions of war and these have led to large inquiries for equipment. Among the inquiries now active for export is one for 90 lathes for export from New York, the money for which is on deposit in a bank, to be paid over as soon as the tools are ready to be shipped. Another inquiry is from France for forty-two 20 to 24-inch lathes and 11 milling machines. Another inquiry is for 50 lathes to go to the Atlantic seaboard for export. The Oliver Typewriter Co., Chicago, has taken a large contract for small parts such as timers for shrapnel shells and recently contracted for 70 small automatic screw machines. The company obtained quick delivery on this order and it was placed ahead of some export material. Part of this was placed with the H. A. Stocker Machinery Co. and part with the Brown & Sharpe Mfg. Co. Forty lathes from the Fred Wolf plant have been bought by a Chicago dealer, the greater portion being prepared immediately for foreign shipment. A number of drills and milling machines also have been disposed of from this assortment.

Want Larger Lathes

IN CINCINNATI, demand for lathes has gradually turned from the 14, 16 and 18-inch sizes to those of larger dimensions. Heavy purchases have been made recently by European nations of sizes ranging all the way from 20 inches up to 36 inches. Machine tool manufacturers have not been taking many orders for more than a month, due to well filled order books and inability to guarantee quick deliveries. The majority of shipments today are to domestic plants working on war orders.

"The Most Perfect Floor Proposition That Can Be Imagined"

¶ That's what the factory manager of Morgan & Wright's Detroit Rubber Works—makers of United States Tires—said about Creosoted Wood Block Floors.

¶ No theory behind this plain statement. He knows what actual working conditions are. He has to deal with problems of efficiency and output at first hand.

¶ He based his opinion on his practical experience with

Ayer & Lord Interior Wood Block Floors

This shows how these blocks are laid. Photograph above shows how the floor becomes ironed out by use into a dense, solid, smooth, uniform mass.

¶ It showed that this floor, properly installed, needs no repairing—costs nothing further. The harder the service, the smoother, firmer, more serviceable it becomes.

¶ It is noiseless; the blocks are warm and dry—easy on the feet—do not reflect light. They are highly sanitary owing to the antiseptic nature of the preservative. The absence of dust in a wood block floor saves delicate bearings from injury, while its resilient character reduces damage to tools and castings.

¶ These conditions bring about better, faster work from employes—maximum efficiency from trucks and machinery. You—as a factory manager or executive—will realize what an AYER & LORD WOOD BLOCK FLOOR can do to increase production and lower costs.

Write us for new booklet "FLOORS"

It contains further information—photographs of installations of every character. Tell us something of your problems—our Engineering Department will gladly advise and specify to suit your conditions, without any obligation being incurred.

Ayer & Lord Wood Block Floors

Carry the heaviest loads—Stand the hardest wear—Resist fire and heat—Don't swell or buckle—Don't damage tools—Are dustless, noiseless, dry and sanitary—Easy on the feet.

Ayer & Lord Tie Company

General Office: Railway Exchange, Chicago

CLEVELAND, OHIO
926 Illuminating Bldg.

MEMPHIS, TENN.
1402 Exchange Bldg.

KANSAS CITY, MO.
1117 Rialto Bldg.

PHILADELPHIA, PA.
319 Perry Bldg.

EASTERN STATES

AUGUSTA, ME.—Swanson Nickel Engineering Co. has been incorporated; $50,000 capital stock; by Earnest L. McLean, S. L. Fogg, Frank E. Southard, E. M. Leavitt and Pauline Lowell.

PORTLAND, ME.—River Smelting & Refining Co. has been incorporated; $300,000 capital stock; by Albert F. Jones, A. B. Farnham, J. P. O'Donnell, J. R. Griffin, Geo. S. Soule.

ATHOL, MASS. — H. M. Peckjam has bought the $15,000 Hapgood factory, formerly occupied by the National Printing & Machinery Co., who has sold its machinery to the Union Twist Drill Co. Mr. Peckham will occupy it for his wood working business.

BOSTON.—Hunter Arms Co. has been incorporated in Massachusetts with $400,000 capital stock. The company has a plant in Fulton, N. Y.

BOSTON.—Mechanical Tire Co. of America has been incorporated; $200,000 capital stock; by Frederick Mansfield Linton, Eugene Kingman Davenport, John Augustine McNamara.

CAMBRIDGE, MASS.—Monks & Johnson, Boston, have figured plans for a brick and steel addition for the Blanchard Machine Co.

EVERETT, MASS. — New England Mfg. Co., which is engaged in the manufacture of high explosives at North Woburn, has purchased property in Everett from the New England Gas & Coke Co. to establish a benzol plant.

LYNN, MASS.—A. B. F. Machinery Co. has been incorporated; $25,000 capital stock; by Lawrence Anderson and William S. Fletcher.

SALEM, MASS. — Hydgrade Incandescent Lamp Co. has plans completed for a 52 x 202-foot plant with L, 11 x 45 feet, to be erected at Boston and Bridge streets.

WORCESTER, MASS.—J. R. Torry Razor Co. is extending its factory building on Piedmont street to handle war contracts.

BRIDGEPORT, CONN. — Smith Patent Tool Holder & Machine Co. has been incorporated; $50,000 capital stock; by Henry Smith, Frank Webb and Burton G. Staab, Fairfield, Conn.

BRIDGEPORT, CONN.—American Bridge Co. has been awarded the contract to build a concentrator building and boiler house for the Bridgeport Brass Co., as an addition to its plant. Each building will be one story, 30 x 60 feet. Plans also are being figured for a foundation for a $75,000, 2-story, brick and steel foundry. The superstructure will be figured later. Fletcher Thompson, Inc., is the architect.

BRIDGEPORT, CONN.—Stratford avenue bridge commission will receive bids at the office of the board of contracts and supplies until noon, Aug. 7 for erecting a reinforced concrete girder bridge, with a double leaf bascule channel span and all substructures and approaches. The bridge will have a 54-foot roadway, two sidewalks, 13 feet wide, and the length of the bridge from abutment to abutment will be 499 feet.

MIDDLETOWN, CONN. — Consolidated Equipment Co. has been incorporated; $100,000 capital stock; by Earle H. Russell, Raymond F. Byrne and H. C. Perry, all stockholders in the Noiseless Typewriter Co. The company will manufacture explosives, shot and ammunition, as well as aeroplanes and chemicals, and it is expected it will occupy part of the Noiseless Typewriter Co.'s plant, or lease the factory of the old Middletown Silver Plate Co.

NEW HAVEN, CONN.—Simplex Air Craft Co. has been incorporated to manufacture aeroplanes, air crafts, motor and accessories; $300,000 capital stock; by Virginius J. Mayo, Stephenson MacGordon and Chance M. Vought.

NEW HAVEN, CONN.—Winchester Repeating Arms Co. has been granted a permit to erect another addition, four stories, 54 x 441 feet. The company also has a permit to erect a 21 x 305-foot addition to its hydraulic plant.

ORANGE, CONN.—Avis Co. has been incorporated to deal in firearms, military and naval guns, ammunition, etc.; $100,000 capital stock; by Samuel R. Avis, George E. Avis and John R. Halstead, New Haven.

WATERBURY, CONN.—Blake & Johnson, 173 North Elm street, have let contract for a 3-story, 41 x 50-foot addition.

PROVIDENCE, R. I.—Hardman Railroad Tie Co. has been incorporated; $25,000 capital stock; by George H. Hardman, Frank S. Brundage, William H. Brown, A. Roscoe de Beverly, Daniel Smith and Alvin Weekes. The company's office is in Newport, R. I., and the plant at Fall River, Mass.

WOONSOCKET, R. I.—Taft-Pierce Mfg. Co., which is building a 3-story brick storehouse at its plant on Pond street, is contemplating also the erection of a four or 5-story building to house the blacksmith shop and painting department and also to be used for the storage of patterns and other purposes.

BINGHAMTON, N. Y. — Union Forging Works, which suffered heavy damage by fire some time ago, will rebuild the plant of fireproof construction on the same site.

EASTWOOD, N. Y.—W. A. Schleit Mfg. Co., hardware, stoves, heating devices, has been incorporated; $200,000 capital stock; by C. E. Cashore, K. G. and Romeyn Wormuth, 713 Cortland avenue, Syracuse.

ENDICOTT, N. Y.—Endicott Forging & Mfg. Co. has been incorporated; $50,000 capital stock; by Ira E. Zimmer, Sidney J. Marshall, William H. Stone, Binghamton, N. Y.

NEW YORK.—New York Central railroad is in the market for a wheel press.

NEW YORK. — Southern Pacific railroad, 165 Broadway, is inquiring for a car wheel grinding machine and some other machines.

NEW YORK.—Tegetmeier & Riepe Co., 781 First avenue, will build an addition to its wagon plant.

NEW YORK.—Jones Pneumatic Tire Spring Co. has been incorporated; $100,000 capital stock; by M. B. Loeb and E. Goldstein, Max Ash, 55 Wall street.

NEW YORK.—Lewis Roller Bearing Co. has been incorporated; $10,000 capital stock; by I. A. Cohen, S. B. Levy, E. Auerbach, 39 West Thirty-fourth street.

NEW YORK.—American Smelting & Refining Co., 165 Broadway, recently took over the Christmas mine near Hayden, Ariz., and is inquiring on a large amount of machinery to be installed at the property. Included in the equipment to be bought are two or three cranes and an aerial tramway, 1¼ miles long.

QUEENS, N. Y.—United Welding & Mfg. Co., machinery apparatus, has been incorporated; $5,000 capital stock; by E. S. Foster, C. Giarcomarra and J. Kohrman, 81 East 125th street.

ROCHESTER, N. Y.—Dodge Construction Co. has been incorporated; $25,000 capital stock; by E. H. Lamb, J. Julian and J. C. Brooks, Rochester.

ROME, N. Y.—The chamber of commerce is raising $25,000 to bring the Senaca Falls Mfg. Co. to Rome from Seneca Falls. The project is assured.

SALAMANCA, N. Y.—Motor Car Products Co. has been incorporated; $20,000 capital stock; by H. L. Odell, A. and A. Ashworth.

SCHENECTADY, N. Y.—General Electric Co. is in the market for 10 to 15 lathes and for some other machine tool equipment.

BEECH CREEK, PA.—Beech Creek Auto Co., Geo. H. Tibbons, secretary, has plans in abeyance for a $25,000, 2-story, automobile factory.

CHERRYTREE, PA. — William Burnside has purchased the plant of the Cherrytree Iron Works for $12,000 and will make numerous improvements. The plant was taken over a year ago by the Cambria Title, Savings & Trust Co., Ebensburg, Pa.

FARRELL, PA.—Farrell & Mercer railroad has received a franchise to construct an electric railroad in Mercer; it is planned to extend a line from Farrell to Mercer.

FLEETWOOD, PA.—Fleewood Metal Body Works is erecting a $40,000, 2½-story plant, of brick and steel construction, 70 x 110 feet, 40 x 299 feet and 40 x 140 feet. Wayne High, architect, Reading, Pa.

GRASSLAND, PA.—Hall Concrete Products Co. has increased capital stock from $25,000 to $100,000.

GREENSBURG, PA. — Moreland county commissioners have awarded a contract for steel bridge over Big Sewickley Creek to Rhinehart Bros., East Liverpool, O., for $10,000.

GROVE CITY, PA.—Mercer county commissioners have awarded the contract for the Pine avenue bridge over Wolf creek to the Penn Bridge Co., Beaver Falls, Pa.

HOLSOPPLE, PA.—N. O. Border, secretary, Benson borough school board, is receiving bids for erecting a brick and steel school building; W. S. Powell, 220 Ohio street, Johnstown, Pa., is the architect in charge.

JOHNSTOWN, PA.—Johnstown Rockwood railroad plans the construction of a railroad extending from Johnstown to Rockwood; the estimated cost is $1,500,000.

MARCUS HOOK, PA.—Viscose Co. will build a 1-story and basement 153 x 423-foot addition, for which contracts have been let.

MERCER, PA.—Mercer county commissioners plan to build eight bridges; L. F. Burnside is county engineer.

NATRONA, PA. — Allegheny and Westmoreland counties contemplate erecting a bridge over the Allegheny river from Natrona to Bareburn, to cost about $225,000.

PHILADELPHIA.—Thomas P. Skelly Bolt Co. has increased its capital stock from $15,000 to $60,000.

PHILADELPHIA.—Barrett Mfg. Co.'s tar still at Thirty-sixth street and Gray's Ferry road, was damaged by fire.

PHILADELPHIA.—Schuylkill Forging & Steel Co. has purchased factory and site of about 1¼ acres at American and Pike streets.

PHILADELPHIA.—Architects Peuckert & Wunder are taking bids for a 2-story, 100 x 198-foot factory building to be erected for the Pangborn Corporation at Hagerstown, Md.

PHILADELPHIA.—A. Merritt Taylor, director of the department of city transit, will open bids Aug. 16, for the construction of 26,000 feet of elevated railroad in Frankford.

PHILADELPHIA.—Brownworth & Co. have been incorporated to manufacture fire escapes; $10,000 capital stock; by W. A. Leisner, C. J. Hogue, Lee S. Leiser, W. L. Betts, G. P. Leiser and William Hall.

PHILADELPHIA.—Baer Mfg Co., automobiles, has been incorporated; $20,000 capital stock; by Frank E. Vandervort, Simon Rosenau, Charles Q. MacDonald, Isaac Geistly, Jerome H. Loucheim and others.

PHILADELPHIA.—Norcross & Edmunds, South Penn Square building, will establish a sand mining plant at Birmingham, N. J. John G. Brown, Witherspoon building, Philadelphia, is the architect and engineer.

PHILADELPHIA.—Philadelphia Rendering Co., Drexel building, has plans in abeyance for a 2-story, 50 x 100-foot plant, to be erected at Thirty-fifth and Hastings streets.

Alfred Weeks, 1433 Chestnut street, is the architect.

PITTSBURGH.—Wheeling & Lake Erie railroad is in the market for an axle lathe.

PITTSBURGH.—A. M. Byers Co. has increased its capital stock from $1,500,000 to $2,000,000.

PITTSBURGH. — A $40,000, 1-story, fireproof addition to the boiler house of the United States Bureau of Mines will be erected.

PITTSBURGH.—Pennsylvania Car & Mfg. Co. has been incorporated; $5,000 capital stock; by Fred T. Weil, C. B. Pritchard, Newton B. Lovejoy, Pittsburgh.

PITTSBURGH.—Wilson-Snyder Mfg. Co., engines, etc., has been incorporated; $10,000 capital stock; by R. J. Wilson and M. G. Bryce, Pittsburgh; H. D. Wilson, Thornburg, Pa.

PITTSBURGH.—It is officially advised the Standard works of the Shelby Steel Tube Co., at New Castle, Pa., will be doubled in capacity; a main mill building, 240 x 600 feet, and several auxiliary buildings, including a power house and foundry will be erected.

PITTSBURGH.—E. B. Lee, Fourth avenue, is preparing plans for a 10 or 12-story loft building, of brick and steel construction, to be erected at Smithfield street and Seventh avenue for the Henry W. Oliver estate; the building will cost about $300,000.

PITTSBURGH.—Standard Smelting Co. has been incorporated in Delaware, capital $100,000, to operate mills for the crushing, sampling and refining and treatment of minerals and ores; incorporators; H. S. Glenn, C. E. Glenn, R. S. Wile and C. R. Rinchut, all of Pittsburgh; Mr. Wile is president of the Wile Electric Furnace Co., Jenkins Arcade building, Pittsburgh.

POTTSTOWN, PA.—National Rubber Co.'s plans for proposed plant include a main building, 65 x 1,000 feet, one story, of steel and concrete construction, and several smaller buildings.

POTTSVILLE, PA. — Schuylkill Haven Pipe Foundry, owned by the W. R. Dunlap Co., Reading, Pa., was badly damaged by fire.

SHARON, PA.—The county commissioners will ask bids on four types of bridges, one of which will be selected to replace the State street bridge. County Engineer Burnside will be in charge.

SHARON, PA.—Valley Mold & Iron Co. is considering increasing the capacity of the Sharpsville, Pa., plant either 50 or 200 per cent according to Floyd K. Smith, general manager. The exact increase will not be determined until plans are adopted within a short time.

SOUTH BETHLEHEM, PA. — Bethlehem Steel Co. is in the market for some 12 to 15 lathes and a number of slotters. This company also is taking bids on some small jib cranes.

YORK, PA.—General Machine Works has increased its debt limit to $10,000.

BLOOMFIELD, N. J.—Henry Brayd, Inc., has been incorporated to manufacture mechanical appliances; $30,000 capital stock; by Thomas A. Hill, Louis Enderle, Brooklyn, and D. H. Douglas, Paterson.

BLOOMFIELD, N. J.—Plans have been filed here by Francisco & Jacobus, engineers, New York, for a new plant to be erected in Bloomfield for the International Arms & Fuse Co. of New York. The plant will be a 1-story, brick and steel structure, 184 x 525 feet, and construction is to begin immediately. The product will be time fuses for projectiles.

FRANKLIN, N. J.—New Jersey Zinc Co. has contracted with the Leonard Construction Co., New York, for steel storage bins and a new separator. A plant also will be erected at the Marshal mines at Ogdensburg, N. J.

JERSEY CITY, N. J.—Architect John T. Rowland, 100 Sip avenue, has about completed plans for a 3-story building to be built by the city at a cost of about $50,000 to contain garage, repair shop and storage.

NEWARK, N. J.—Essex Electric Co. has been incorporated to manufacture electrical appliances; $125,000 capital stock; by J. H. Lippincott, Thomas S. Woodruff and William A. Smith, all of New York.

TRENTON, N. J.—Bradley Nitrating Co. has been incorporated to manufacture munitions with $2,500,000 capital stock. The office will be at 15 Hamilton street, Newark, N. J. The company's registered agent is Parker R. Bradley.

WILMINGTON, DEL. — Brunston Automatic Electric Lighting & Power Co., manufacturer, has been incorporated; $1,000,000 capital stock; by William J. Maloney, Herbert E. Latter and Norman P. Coffin, all of Wilmington.

BALTIMORE.—C. C. Smith Co., Bayard and Bush streets, will erect two new factory buildings, each one story, 52 x 86 feet.

BALTIMORE.—National Yeast Co., Colgate station, Baltimore county, has plans in progress for a number of factory buildings to be erected shortly. These structures include one 2 and 3-story, 75 x 75-foot, one 2 and 3-story, 50 x 80-foot, one 1-story, 40 x 45-foot and one 1-story, 20 x 38-foot building.

WASHINGTON.—An American consul in New Zealand reports a city contemplates the installation of a $165,000 water works plant. Steel spiral pipe is to be used for the mains. Refer to No. 17378, bureau of foreign and domestic commerce.

WASHINGTON.—Jas. A. Wetmore, acting supervising architect, Washington, will receive bids till July 30 for an electric generator and generator panel, to be installed in the experimental station, United States bureau of mines, Pittsburgh.

Just Out Visiting!

OPPORTUNITY knocks once at every man's door.
We are not knockers
But—
Here is opportunity.

Bethlehem Steel Co., South Bethlehem, Pa., is in the market for 12 or 15 lathes and a number of slotters. This company also is taking bids on some small jib cranes.

General Electric Co., Schenectady, N. Y., is in the market for 10 or 15 lathes and for some other machine tool equipment.

Southern Pacific railroad, 165 Broadway, New York City, is inquiring for a car wheel grinding machine and some other equipment.

New York Central railroad is in the market for a wheel press.

Wheeling & Lake Erie railroad, Pittsburgh, is in the market for an axle lathe.

American Smelting & Refining Co., 165 Broadway, New York City, recently took over the Christmas mine near Hayden, Ariz., and is inquiring on a large amount of machinery to be installed at the property. Included in the equipment to be purchased are two or three cranes and an aerial tramway, one and a half miles long.

Equipment will be required by the Mosler Safe & Lock Co., Hamilton, O., which is building a power plant.

Saturn Machine Co., Wheeling, W. Va., will install and equip a brass foundry.

Burd High Compressor Ring Co., Rockford, Ill., advises it is beginning the installation of machinery in its new factory addition, containing 30,000 square feet of floor space.

Lebanon Electric Light Co., Lebanon, Tenn., has been organized and will purchase equipment for an electric light plant.

It is officially advised the Standard works of the Shelby Steel Tube Co. at New Castle, Pa., will be doubled in capacity. A main mill building, 240 x 600-feet, and several auxiliary buildings, including a power house and foundry will be erected.

Valley Mold & Iron Co. plans greatly increasing the capacity of the Sharpsville, Pa., plant. The exact increase will not be determined until plans are adopted within a short time.

CENTRAL STATES

AKRON, O.—M. A. Knight, manager of the Knight Pottery Co., and others of Akron have organized the Deaker Hill Coal Co. to manufacture coke and by-products of coke and coal, including dyes. The company has purchased a tract in the Kingwood coal district.

ASHLAND, O. — Bess Welty, clerk of county commissioners, will receive bids until Aug. 6, for the construction and repair of several bridges.

ASHTABULA.—Edwin Harmon Estates Development Co. has been preparing plans for a high level bridge over Ashtabula creek at Main street and is about to ask the county's permission to go ahead with construction.

CANTON, O.—American Electric Clock Co., Ashland, O., capitalized at $100,000, will move to Canton, and is preparing a 60 x 100-foot factory building for installation of machinery. The company plans erecting its own building as soon as possible.

CINCINNATI.—Rich Pump Co. has leased the former factory building of the American Pole & Shaft Co. on West Front street. The Rich company will assume charge of the addition on Aug. 1, which will about double its present working capacity. Some new equipment will be purchased shortly.

CINCINNATI.—About 900 tons of structural steel will be required for a 6-story building to be erected at Eighth and Broadway streets. Plans are being prepared by Zettle & Rapp, architects.

CLEVELAND.—Taylor & Boggis Foundry Co. has increased its capital stock from $150,000 to $200,000.

CLEVELAND.—Cuyahoga River Power Co.

has increased its capital stock from $10,000 to $210,000.

CLEVELAND.—Federal Gear Co. has increased its capital stock from $1,000 to $25,000.

CLEVELAND.—Bids will be taken shortly for a brick and steel addition to the plant of the Chandler Motor Car Co. Earnest McGeorge is preparing plans.

CLEVELAND.—Giant Cable Hoist Co. has been incorporated; $20,000 capital stock; by John S. Clarke, B. D. Williams, Leon H. Phillips, Sidney Bush, Parke O. Rowland and T. D. Lemieux.

CLEVELAND.—Simmons Metal Construction Co. has been incorporated; $25,000 capital stock; by D. H. Tilden, Horatio Ford, Ben B. Wickham, G. D. McGwinn, N. I. Young.

CLEVELAND.—Vichek Tool Co. will erect a $12,000, 3-story, brick and steel addition to the plant at 10701 Quincy avenue. The first floor will be a shipping room, with a machine shop on the second floor and storage space on the third floor. John W. Sullivan is architect.

CLEVELAND.—Comissioner of purchases and supplies will receive bids until noon, July 28 for water tube boilers for the Division avenue pumping station; at noon, July 29 for a steel hull for the fire boat Clevelander, and at noon, July 30 for transformers for the municipal light department.

COLUMBUS, O.—The city administration is encountering some opposition in its effort to issue $265,000 in bonds for extensions and improvements to the municipal light plant.

DAYTON, O.—A factory for manufacturing gasoline and oil driven farming implements will be started by C. C. Wilson, on South Summit street.

FREMONT, O.—Herbrand company, manufacturer of axles and other drop forge parts for automobiles, is erecting a $20,000 addition to its plant.

HAMILTON, O.—Power plant equipment will be required by the Mosler Safe & Lock Co., which is building a new power house.

LIMA, O.—C. H. & D. railroad will spend $33,000 for improvements in Lima, including a $20,000 coaling station, a $6,000 oil station and $7,000 worth of tools for the Lima shops.

MARIETTA, O. — Turner Frick Electric Co., Pittsburgh, will apply for an electric light franchise if the city does not erect a plant of its own.

SPRINGFIELD, O.—E. L. Shuey is considering the erection of a second factory building.

SPRINGFIELD, O.—Bauroth Machine & Tool Co., Toledo, has purchased the Webster Perk Tool Co., Springfield. All machinery will be moved to Springfield where quarters will be taken in the Springfield Factories building.

STEUBENVILLE, O.—Steubenville Stone Co. plans to erect a $30,000, 4-story warehouse this fall. Peterson & Co., architects, are revising plans.

TOLEDO, O. — United States Malleable Iron Co. has increased its capital stock from $150,000 to $250,000.

TOLEDO, O. — Willys-Overland Co. will erect a $250,000 assembling plant and warehouse in St. Paul, Minn.

WEST FARMINGTON, O. — Equipment Mfg. Co. has increased its capital stock from $40,000 to $60,000.

YOUNGSTOWN, O.—Brier Hill Steel Co. has decided to install a 75-ton open-hearth furnace and will make several minor improvements in its open hearth department.

HUNTINGTON, W. VA.—Oliver & Maupin, engineers, will be in charge of erecting the superstructure of a steel bridge over the Chesapeake & Ohio railroad's right of way near Milton.

WHEELING, W. VA. — Saturn Machine Co. will install and equip a brass foundry; E. W. Krause is manager.

COVINGTON, KY.—The county court has appropriated $20,000 for a steel bridge over the Hatchie river near Rialto. Lauderdale county has appropriated $20,000 for its share of the cost.

DANVILLE, KY.—Ice-crushing and conveying equipment will be purchased by the Danville Ice & Coal Co.

FULLERTON, KY.—John Davis will purchase equipment for an electric light plant. He has a building.

HAZARD, KY.—E. C. Lilly, Bluefield, W. Va., is promoting a company to build a power plant to serve coal mines in Southeastern Kentucky.

HINDMAN, KY.—This town is considering issuing bonds for an electric light plant. Address the mayor.

JEFFERSON, KY.—Plant of the United Safety Powder Co., which was badly damaged by an explosion last week, will be rebuilt at once.

JENKINS, KY.—A local company is being organized for the purpose of operating a street lighting system, for which the town will create a franchise. Address the mayor.

LEXINGTON, KY. — A $150,000 bridge over the Kentucky river near Clays ferry for highway and interurban use on line of the Dixie highway has been proposed by County Judge Bullock.

MAYSVILLE, KY. — The plant of the Maysville Cotton Mills, recently damaged by fire, is to be rebuilt, plans for new buildings now being under way. Machinery is being purchased.

EAST CHICAGO, IND.—Grasselli Chemical Co. is to build an addition 106 x 300 feet and add to its equipment.

ELKHART, IND.—Insulating Products Co., recently incorporated with $100,000 capital stock by P. L. Turner, Elkart, and others, will erect a plant.

EVANSVILLE, IND.—Evansville & New Harmony Traction Co. has arranged with M. A. Peoples Co., Chicago, for financing 30 miles of railroad between Evansville and New Harmony. C. J. Seibert, Evansville, is general manager.

INDIANAPOLIS.—Grapho-Metal Products Co., manufacturer, has been incorporated; $200,000 capital stock; by Frank O. Fitton, W. A. Bristor and A. H. Schaegel.

INDIANAPOLIS. — Auto Equipment Co. has been incorporated to manufacture automobile accessories and parts; $10,000 capital stock; by H. A. Comstock, C. V. Fletcher and C. A. Risdon.

OWENSVILLE, IND.—Owensville Metallic Batten Co. is installing new power plant equipment and extending its facilities.

VERSAILLES, IND.—Citizens have voted in favor of a municipal water works system.

AURORA, ILL.—Van Sicklen Speedometer Co., Lincoln building, is planning to build a plant containing 100,000 square feet of floor space.

CHICAGO.—H. Root Foundry Co., 1749 Ballou street, is about to erect a $2,000, 1-story addition.

CHICAGO.—Universal Valve Co. has been incorporated; $50,000 capital stock; by Jacob B. Knudson, Ray Densmore, 6444 Ellis avenue and Frank Ory, 2450 Emerald avenue.

CHICAGO.—McKenzie Steel Post Co. has been incorporated to manufacture fence posts and other devices of steel; $15,000 capital stock; by Henry Rawstrom, William H. Potter and Benjamin F. Ninde, 112 West Adams street.

CHICAGO.—C. L. Deering & Son, Lake and Sheldon streets, are about to erect a $30,000, 2-story addition to their sheet metal shop.

CHICAGO.—Wildman Boiler & Tank Co., 3458 Archer avenue, has incorporated its business with $15,000 capital stock. Its principal output is boilers.

CHICAGO.—LaGaucear-Rowe Engine Co. has been incorporated; $8,400 capital stock; by Charles A. Rowe, Jacques LaGaucear and Harry H. Armstrong.

CHICAGO.—Pitner Gas Iron Co. has been incorporated; $50,000 capital stock; by Albert M. Blum, Isador Wolfsohn and Henry S. Blum, 105 West Monroe street.

CHICAGO.—C. A. Eckstrom, architect, 5 North La Salle street, is preparing plans for the Sidlo Steel Co., for a 5-story factory at 2300 Canal street.

CHICAGO. — Bertram Electric Co., 1414 West Randolph street, is building a 5-story addition to its plant costing $24,000. J. A. Rodgers, 155 North Clark street is architect.

CHICAGO.—Davidson, Lockwood & Weiss, architects, 53 West Jackson boulevard, will take bids about Sept. 1 on a 3-story factory owner's name withheld.

CHICAGO.—Modern Tool & Stamping Co., 313 South Clinton street, has been incorporated; $10,000 capital stock; by Bernard J. Merkle, Abram Kerff and Elmer D. Brothers.

FRANKLIN PARK, ILL.—Gits Electrical Co. has been incorporated to manufacture electric appliances; $16,000 capital stock; by A. B. Kirchoff, James O'Malley and others.

MONMOUTH, ILL.—Monmouth Plow Co. is planning to build a 4-story addition to its plant following increase of its capital stock from $150,000 to $750,000.

PARIS, ILL.—Bids will be received until Aug. 2 for a steel plate girder bridge on reinforced concrete foundation. K. J. Barr, county superintendent of highways, Paris, Ill.

PEORIA, ILL.—Crescent Forge & Shovel Co. is building a 60 x 208-foot addition.

ROCKFORD, ILL.—Burd High Compression Ring Co. is beginning the installation of machinery in its new factory addition, containing 30,000 square feet of floor space.

ALMA, MICH.—The board of trade has retained the plant of the Republic Motor Truck Co., by raising $10,000 toward the purchase of the building now occupied by the company. A tract of the adjoining land also will be purchased.

BATTLE CREEK, MICH.—H. B. Sherman, of the Sherman Mfg. Co., has been petitioned by 2,200 business men to erect his proposed plant of the Consolidated Press & Tool Co. in Battle Creek instead of Hastings, Mich. It is said Battle Creek will have to equal Hasting's offer of cheap power before any change will be made in the present plans.

KALAMAZOO, MICH.—The property of the old Michigan Buggy Co. was sold to W. B. Smith, T. H. Walbridge, Toledo, O.; J. B. Shiffit, Cleveland; James H. Johnson, South Haven, Mich., and C. E. Tracht, Hicksville, O. The purchasers will perfect a company for the manufacture of an automobile to sell for under $700. It is said $60,000 was paid for the plant.

KENOSHA, WIS. — Simmons Mfg. Co., steel beds, springs, etc., has signed a contract to purchase the pumping station of the Kenosha municipal waterworks system for $25,000 in cash and 7 acres of land on Lake Michigan and the city now will start constructing a new station on the site and build a new intake into Lake Michigan. The work will cost in excess of $250,000. B. C. Brennan is superintendent.

MILWAUKEE. — Badger-Packard Machinery Co., 76 West Water street, has increased its capital stock from $50,000 to $75,000 to accommodate its increased business. The company specializes in used machinery.

MILWAUKEE.—Sanger Automobile Co., operating one of the largest garages in Milwaukee, will double its capacity by building

an addition, requiring an electric elevator, steel shutters, rolling doors and other fireproofing material. Machine shop equipment will be purchased from time to time.

MONTELLO, WIS.—The county supervisors have engaged Architects Parkinson & Dockendorff, LaCrosse, Wis., to plan a new courthouse, county jail and sheriff's residence costing about $55,000; jail will contain 10 steel cells.

OCONOMOWOC, WIS. — Bids will be opened by the board of public works on July 28, for furnishing 20 tons of cast iron pipe; 5 tons to be 6-inch and 15 tons 4-inch.

PORTAGE, WIS.—Western Storage Battery Co., Chicago, has removed its plant and general offices to Portage, and is now operating its new plant here. The concern will specialize in the manufacture of small individual electric lighting plants for villages, farmers and similar purposes and will be a heavy buyer of gasoline engine and transmission equipment. William Petschel is president.

RACINE, WIS.—J. I. Case Threshing Machine Co., which recently purchased the plant, equipment and business of the Perfection Road Machinery Co., Galion, O., will consolidate the Galion works with the main plant at Racine. This will give the Case company a complete line of road machinery.

WITTENBERG, WIS.—Plans are being prepared by W. G. Kirchoffer, 22 North Carroll street, Madison, Wis., for a water works plant to cost $12,000.

DREXEL, MO.—The city council has plans for a $10,000 municipal electric light plant.

JOPLIN, MO.—Campbell Machinery Co. has been incorporated; $6,000 capital stock; by J. B. Corby, J. E. Campbell and J. B. Rood.

KANSAS CITY, MO. — Columbian Steel Tank Co., recently noted as incorporated, plans to build two 150 x 300-foot factory buildings and an 8-story warehouse at a cost of $250,000. Andrew A. Kramer is president.

KANSAS CITY, MO.—Henrici, Kent & Lowry Engineering Co., consulting engineer, 715 Reserve bank building, Kansas City, has made plans for two identical power plants for Roy W. Cropper at Keytesville, Mo., to be located at Keytesville and Bosworth, Mo., which will include a 30-kilowatt generator, three phase, 60 cycle, 2300 volt, belted to an oil engine developing about 50 horsepower.

ST. JOSEPH, MO.—An election will be held soon on issuing $75,000 in bonds for improvements to the electric light plant.

ST. LOUIS.—Ozark Iron & Furnace Co. has been incorporated to do a general mining and smelting business; $60,000 capital stock; by E. J. Burton, Louis J. Winkler and Thomas H. Galbrath.

BURLINGTON, IA.—At a recent election citizens voted in favor of constructing a bridge over the Mississippi river at Burlington.

SOUTHERN STATES

NEWPORT NEWS, VA.—Coke, Von Schilling & Gentis, machinery, have been incorporated; $25,000 capital stock; by Franz von Schilling, Hampton, Va.; E. L. Gentis, W. L. Cooke.

SPARTANBURG, N. C.—Suspension Bearing Co. has been incorporated; $10,000 capital stock; by Isaac Andrews, M. G. Stone, W. W. Lancaster.

VICKSBURG, MISS.—Bids will be received until Aug. 12 by the third Mississippi river district, Box 404, for construction and delivery of steel barges.

NEW ORLEANS, LA. — National Fish, Game, Produce & Ice Co. has been incorporated with $250,000 capital stock, and will build an ice and cold storage plant at a cost of $100,000. O. B. DeLord, president; F. F. Phillibert, secretary-manager.

AUSTIN, TEX. — Cotton Pickers' Steel Spring Knee Pad Mfg. Co. has been organized and will build a plant to manufacture patent knee pads for cotton pickers. W. R. Halsey is interested.

CHATTANOOGA, TENN. — Chattanooga Pure Food Co. will need boilers for its new plant. Address Edward J. Bedoit.

CHATTANOOGA, TENN.—Parish Coffee Co. will erect a 3-story factory building. Motors will be used for the operation of special machinery.

LEBANON, TENN. — Lebanon Electric Light Co. has been organized and will purchase equipment for an electric light plant; franchise has been awarded.

MARYSVILLE, TENN.—Ralph E. Oliver has been awarded the contract for constructing a water works system for Barysville on a bid of $55,000. R. C. Huston & Co., Memphis, designed the plant.

MEMPHIS, TENN.—Layne & Bowler Co. is equipping a plant to manufacture turbine pumps and other water works equipment.

NASHVILLE, TENN.—The warehouse of the Southern Mill Supply Co. recently suffered about $40,000 loss by fire. The company will resume business with a new stock of transmission machinery and power plant supplies.

SLEMER, TENN.—McNairy county court has appropriated $1,515 for erecting four steel bridges.

SODDY, TENN.—Richmond Hosiery Mills, Rossville, Ga., will erect at once a branch mill in Soddy to be equipped with motor-driven knitting machines.

WATERTOWN, TENN.—Watertown Power Co. will purchase two boilers, two engines, two generators, switchboard and other equipment for an electric light plant.

BIXBY, OKLA.—An election will be held soon to vote on the question of issuing $4,000 in bonds for a municipal electric light plant.

MUSKOGEE, OKLA.—A committee has been appointed by the Greater Muskogee association to prepare plans and estimates for a dam to supply power for a hydro electric plant, on Grand river near Muskogee.

OKLAHOMA CITY.—Ford Motor Co., Detroit, has purchased a large tract of ground in the center of the city and will start work in the fall of erecting a large assembling plant, to be from four to six stories high, of brick and ornamental tile construction. About 200 to 300 persons will be employed.

WELLSTONE, OKLA.—Benham Engineering Co., Oklahoma City, Okla., is preparing plans for a water works system at a cost of $20,000.

WESTERN STATES

HETTINGER, N. D.—Bonds for $75,000 have been voted for a water works plant on plans prepared by Engineer Green of Spokane, Washington.

FULLERTON, NEB.—Bonds for $28,000 have been voted for a municipal electric light plant.

LINCOLN, NEB.—State Board of control is to spend about $26,000 for enlargements and improvements at the power and heating plant at the state penitentiary.

MINDEN, NEB. — Kearney county clerk has applied for state aid for a steel and concrete bridge across Platte river.

HUTCHINSON, KAS. — W. B. Harris, county engineer, has prepared estimates on two bridges over Arkansas river, one at Hutchinson and one at Nickerson.

SPEARVILLE, KAS.—An election will be held soon on issuing $25,000 in bonds for a water works system. E. T. Archer & Co., Midland building, Kansas City, Kas., are engineers.

GLENDIVE, MONT. — Bids have been asked on a bridge over the Little Missouri river consisting of three spans 120 feet each to cost $18,000.

SHERIDAN, WYO.—County commissioners have ordered the erection of a steel bridge over Little Goose river.

IDAHO FALLS, IDA.—It is reported the Western Mill & Elevator Co., Denver, will construct a flour mill and terminal elevators in Idaho Falls.

OSBURN, IDA.—It is reported the Hercules mine, with property near Burke, Ida., will erect an independent smelter near Osburn.

BULTER, WASH.—W. H. Dopp, Vancouver, Wash., will begin shortly constructing a 30,000-foot capacity saw mill in Butler.

EVERETT, WASH.—Election will be held Aug. 24 on the question of issuing $600,000 or $1,100,000 in bonds on two propositions for a water works plant and supply.

NORTHPORT, WASH.—It is reported the Northport smelter may be reconstructed.

SEATTLE.—Olympic Steel Works has been incorporated; $20,000 capital stock; by C. W. Kucher, F. D. Moore and A. E. Greene.

SEATTLE.—Anderson Steamboat Co. contemplates entering the Sound field, if proper terminal facilities can be secured. The plan includes two ferry boats to cost about $50,000 each.

ASTORIA, ORE.—Port of Astoria will construct two vessels to cost $50,000.

EASTSIDE, ORE.—S. B. Cathcart, county engineer, has approved an estimate on the construction of a water works plant at $40,000.

MEDFORD, ORE.—Rogue' River Valley railroad has been transferred to the Southern Oregon Traction Co. for $60,000 and the entire eight miles are to be electrified.

NORTH YAKIMA, ORE.—Bids will be received shortly by the county commissioners for a 60-foot steel bridge, northeast of Sunnyside and a 45-foot, steel bridge over Wenas creek.

PORTLAND, ORE.—W. A. Vigger Iron Works has been incorporated; $15,000 capital stock; by W. Arthur Viggers, L. J. Viggers and others.

PORTLAND, ORE.—Spokane, Scotland & Seattle railroad, A. W. Lupier, chief engineer, Portland, has asked the war department for permission to build a draw bridge over the Skipanon creek for Warrentown.

TILLAMOOK, ORE.—The contract for a steel bridge at Hoquarton slough was awarded to Feeney-Bremer Co. at $6,650.

SAN RAFAEL.—An election will be held Aug. 28 on the question of issuing $3,000,000 in bonds for a water system.

NEW CATALOGS

HELICAL GEARS.—The William Tod Co., Youngstown, O., has published an interesting postal card, depicting a large double helical gear installation in a cold mill.

TERNE PLATES.—Three 4-page folders issued by the Wheeling Corrugating Co., Wheeling, W. Va., contain descriptions of its 47-pound terne plate, various types of roofing terne plates and other varieties of terne products.

AUTOMATIC NUT TAPPER.—The head or tap holder of the automatic nut tapper made by the National Machinery Co., Tiffin, O., is interestingly and graphically explained in a 2-page pamplet of novel design issued recently. An illustration of the device is presented.

WOOD BLOCK FLOORS.—A handsome 18-page brochure is published by the Ayer & Lord Tie Co., Chicago, descriptive of advantages resulting from the use of interior wood block floors in manufacturing plants. A number of views of these floors in use under severe conditions are presented.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery to Dec. 31.)

Bessemer, valley	$14.00
Bessemer, Pittsburgh	14.95
Basic, Pittsburgh	13.95
Basic, eastern Pa.	13.75 to 14.00
Malleable, Pittsburgh	13.70 to 13.95
Malleable foundry, Chicago	13.00
Malleable foundry, Philadelphia	15.00 to 15.25
Malleable foundry, Buffalo	12.50 to 13.00
No. 1X foundry, Philadelphia	14.75 to 15.00
No. 2 foundry, Pittsburgh	13.70 to 13.95
No. 2 foundry, valley	12.75 to 13.00
No. 2 foundry, Cleveland	13.50
No. 2 foundry, Ironton	12.50 to 12.75
No. 2 foundry, Chicago	13.00
No. 2X foundry, Philadelphia	14.50 to 14.75
No. 2X fdy., N. J. tidewater	14.25 to 14.50
No. 2X foundry, Buffalo	12.50 to 13.00
No. 2 plain, Philadelphia	14.25 to 14.50
No. 2 plain, N. J. tidewater	14.00 to 14.25
No. 2 plain, Buffalo	12.25 to 12.50
No. 2 southern, Birmingham	9.50 to 10.00
No. 1 southern, Cincinnati	12.40 to 12.90
No. 2 southern, Chicago	13.50 to 14.00
No. 2 southern, Phila. delivery	14.00 to 14.25
No. 2 southern, Cleveland	13.50 to 14.00
No. 2 south'n, New York docks	13.75 to 14.00
No. 2 southern Boston, docks	13.75 to 14.00
No. 2 south. interior, New Eng.	14.50 to 15.50
No. 2 southern, St. Louis	12.90 to 13.40
Virginia No. 2X furnace	12.50 to 13.00
Virginia 2X, Philadelphia	15.25
Virginia 2X, Jersey City	15.50
Virgina 2X, Boston points	15.75
Gray forge, eastern Pa.	13.25 to 13.50
Gray forge, Pittsburgh	13.20 to 13.45
Gray forge, Birmingham	8.75 to 9.00
Silveries, 8 per cent, Jackson, O.	14.75 to 15.25
Silveries, 5 per cent Birmingham	12.50
Silveries, 5 per cent, Chicago	16.35
Standard low phos., Phil.	21.50 to 21.75
Lebanon low phos., furnace	16.50 to 17.00
Low phos., Pittsburgh	20.95 to 21.20
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	15.75 to 16.25
Charcoal, Buffalo	15.75 to 17.00
Charcoal, Birmingham	21.00

IRON ORE

Lake Superior Ores.

(Lower lake ports.)

Old range Bessemer, 55 per cent	$3.75
Mesabi Bessemer, 55 per cent	3.45
Old range, non-Bess., 51½ per cent	3.00
Mesabi non-Bessemer, 51½ per cent	2.80

FOREIGN ORES

(Per unit Philadelphia.)

(Prices nominal.)

Foreign Bess., 50 to 65 per cent	8 to 8½c
For'n non-Bes., 50 to 65 per cent	8 to 8½c

COKE

(At the ovens)

Connellsville furnace	$1.70 to 1.75
Connellsville fur. contr.	1.65 to 1.75
Connellsville furnace coke, fourth quarter	1.75
Connellsville foundry	2.00 to 2.40
Connellsville fdy. contr.	2.25 to 2.50
Wise county furnace	1.75 to 2.00
Wise county foundry	2.25 to 2.50
Pocahontas furnace	1.75 to 2.00
Pocahontas foundry	2.00 to 2.25
New River, foundry	2.50 to 3.25
New River, furnace	2.00 to 2.25

FERRO-ALLOYS

Ferro mang., furnace (prompt)	$95 to 100
Ferro mang., Balti. (future)	95 to 100
Ferro-silicon, 50 per cent, Pbgh.	71.00 to 73.00
Ferro-silicon, 50 per cent, Phila.	71.00 to 73.00
Ferro-sil., 12 to 13 per cent	18.00 to 18.50
Ferro-sil., 11 to 12 per cent	17.00 to 17.50
Ferro-sil., 10 to 11 per cent	16.00 to 16.50
Ferro-sil., 9 to 10 per cent	15.00 to 15.50
(Ferro-silicon quoted at furnace Ashland, Jackson and New Straitsville.)	
Ferro-carbon titanium, carloads, per lb.	8c to 12½c
Ferro vanadium, Pbgh. per lb. alloy	$2.25
Ferro tungsten, per lb. of alloy	2.50
Ferro chrome, per lb., Niagara Falls	20c

SEMI-FINISHED STEEL

Open hearth billets, Phila.	$25.06
Forging billets, Phila.	29.00 to 30.00
Forging billets, Pbgh.	28.00 to 29.00

Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama canal, per 100 lbs., in carload lots, exclusive of insurance and dockage.

From New York	$0.45
From Pittsburgh	.619
From Youngstown	.619
From Niles	.619
From Wheeling	.619
From Steubenville	.619
From Johnstown	.604
From Coatesville	.545
From Steelton	.555
From Bethlehem	.529
From Cleveland	.65
From Chicago	.765

Wire rods, Pittsburgh	$26.00
Bess. bill., Youngstown	21.00
Open hearth billets, Youngstown	21.50
Bessemer billets, Pittsburgh	22.00
Open hearth billets, Pittsburgh	22.50 to 23.00
Bess. sheet bars, Youngstown	21.50 to 22.00
Op. h'th sheet bars, Youngstown	22.50 to 23.00
Bess. sheet bars, Pittsburgh	21.50
Op. h'th sh. bars, Pbgh.	22.50 to 23.00
Muck bar, Pittsburgh	27.00

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh.	1.25c
Stand. open-hearth rails, Pbgh.	1.34c
Lgt. rails, 8-lbs., Pbgh. & Chgo.	1.22c
Lgt. rails, 12 lbs. Pbg. & Chgo.	1.17c
Lgt. rails, 16 to 20 lbs., Pgh. & Chgo.	1.12c
Lgt. rails, 25 to 45 lbs., Pbgh. and Chgo.	1.07c
Relaying rails, standard, Pbg. & Chgo.	$23.00 to 24.00
Relaying rails, light, Chgo.	21.50 to 22.50
Angle bars, st. sect. Pbgh. base.	1.50c
Angle bars, st. sections, Chicago	1.50c
Spikes, railroad, Pbgh.	1.40c
Spikes, railroad, Chgo.	1.50c to 1.55c
Track bolts, Pbgh.	1.95c to 2.00c
Track bolts, Chgo.	2.00c

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	3.00
New England	3.00
Philadelphia	2.79
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.00 to 1.50
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r., and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York (rail and water)	4.25
Philadelphia (all rail)	5.20
Philadelphia (rail and water)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago, to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.47
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	1.25c to 1.30c
Structural shapes, Chicago	1.49c
Structural shapes, Philadelphia	1.409c to 1.459c
Structural shapes, New York	1.419c to 1.469c
Struc. shapes, San Francisco	2.00c to 2.05c
Tank plates, Chicago	1.44c to 1.49c
Tank plates, Pittsburgh	1.20c to 1.30c
Tank plates, Philadelphia	1.409c to 1.459c
Tank plates, New York	1.419c to 1.469c
Bars, soft steel, Pittsburgh	1.25c to 1.30c
Bars, soft steel, Chicago	1.49c
Bars, soft steel, Philadelphia	1.409c
Bars, soft steel, New York	1.469c
Hoops, carloads, Pittsburgh	1.25c to 1.30c
Bands, Pittsburgh	1.25c to 1.30c
Shafting, Pbgh., contr.	65 to 66 off
Bar iron, Chicago	1.20c
Bar iron, Philadelphia	1.22c to 1.27c
Bar iron, New York	1.20c to 1.25c
Bar iron, Cleveland	1.20c to 1.25c
Bar iron, Pittsburgh	1.25c to 1.30c
Hard steel bars, Chicago	1.20c to 1.25c
Smooth finish, mchy. steel, Chi.	1.68c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	1.75c to 1.80c
No. 28, black, Chicago	1.89c to 1.94c
No. 28, tin mill, black, Pbgh.	1.80c to 1.85c
No. 28, galvanized, Pbgh.	4.25c to 4.50c
No. 28, galvanized. Chgo., nom.	
No. 10, blue, anld., Pbgh.	1.35c to 1.40c
No. 10, blue, annealed, Phila.	1.559c to 1.609c
Tin plate, 100 lb., coke base.	3.10c to 3.20c

EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

Single pickled, cold roll, and re-anl.	30 cents
Hot roll'd pick'd and anl., tin mill	25 cents
Full pickl'd, cold rolled and re-anl.	50 cents
Auto sheets	75 cents
Blued stove pipe stock	10 cents
Range steel	30 cents
Re-squarring	10 cents
Roller leveling	10 cents
Patent leveling and re-squarring	35 cents
Oiling sheets	10 cents
Deoxidizing	10 cents
Lime finish	10 cents
Open-hearth stamping steel, free from mill scale	55 cents
Special open hearth deep stpg. steel free from mill scale	80 cents
Extra deep special auto body stock	$1.25
Ext. for 28 gage ov. 32 to 36-in. wide	10 cents
No reduction for sheets not annealed.	

The above extras apply on both sheet and tin mill specifications, at the same rate.

IRON AND STEEL PIPE

(Pittsburgh.)

	Black. Butt-weld.	Galv. Butt-weld.
Steel, ¾ to 3 inches	79	57½
Iron, ¾ to 2½ inches	71	46
	Lap-weld.	
Steel, 2½ to 6 inches	78	62½

BOILER TUBES

Steel, 3½ to 4½ inches l. c. l.	72
Iron, 3½ to 4½ inches l. c. l.	61

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotation.)

Wire nail jobbers, Pittsburgh	$1.60
Plain wire, jobbers, Pittsburgh	1.40
Galvanized wire, jobbers, Pbgh.	2.20
Polished staples, Pbgh.	1.70
Galvanized staples, Pbgh.	2.50
Barb wire, painted, jobbers, Pbgh.	1.70
Barb wire, galv., jobbers, Pbgh.	2.50